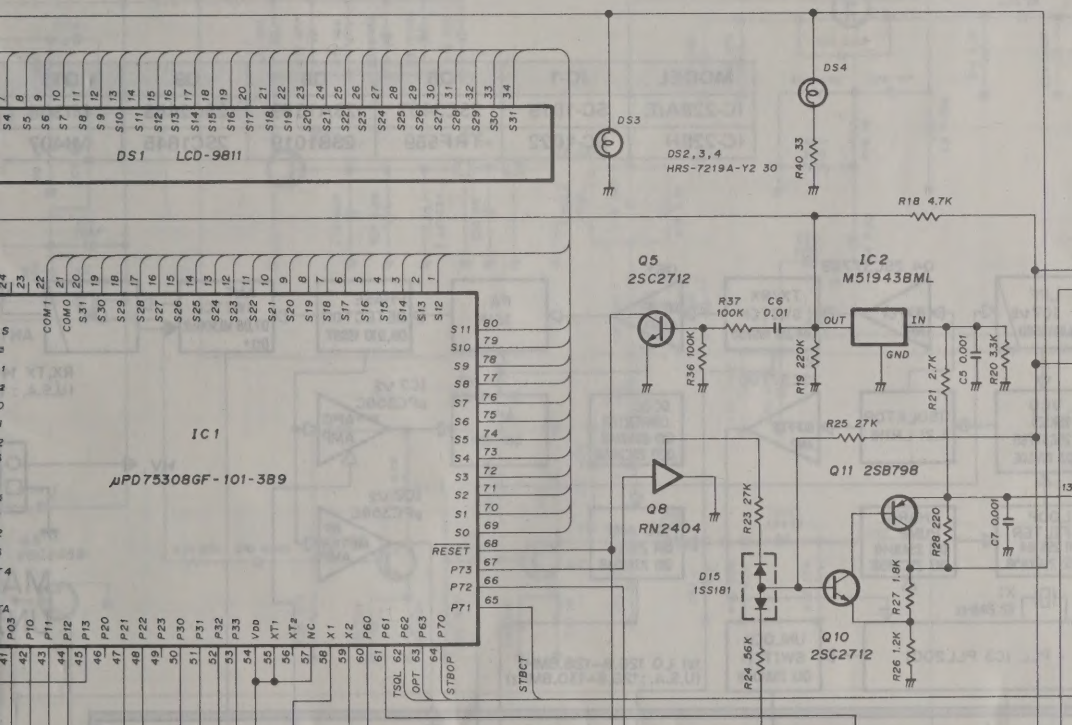
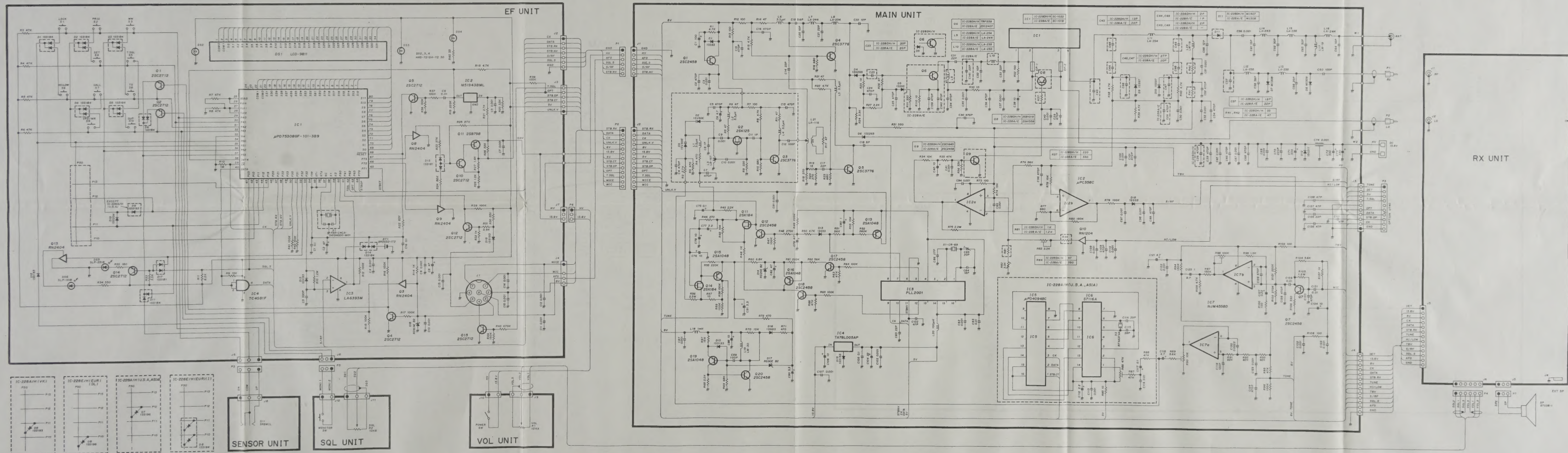


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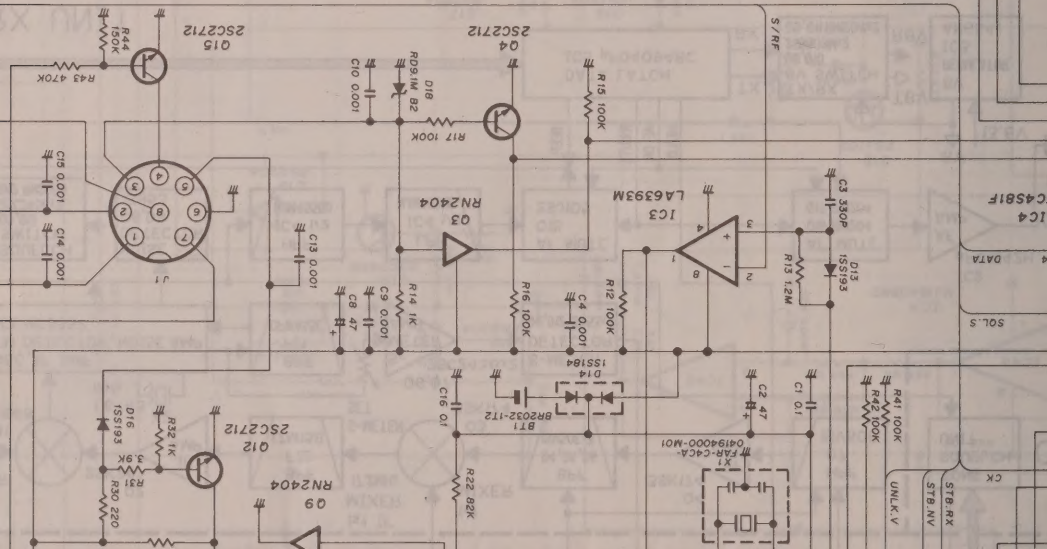


IC-228A IC-228E IC-228H

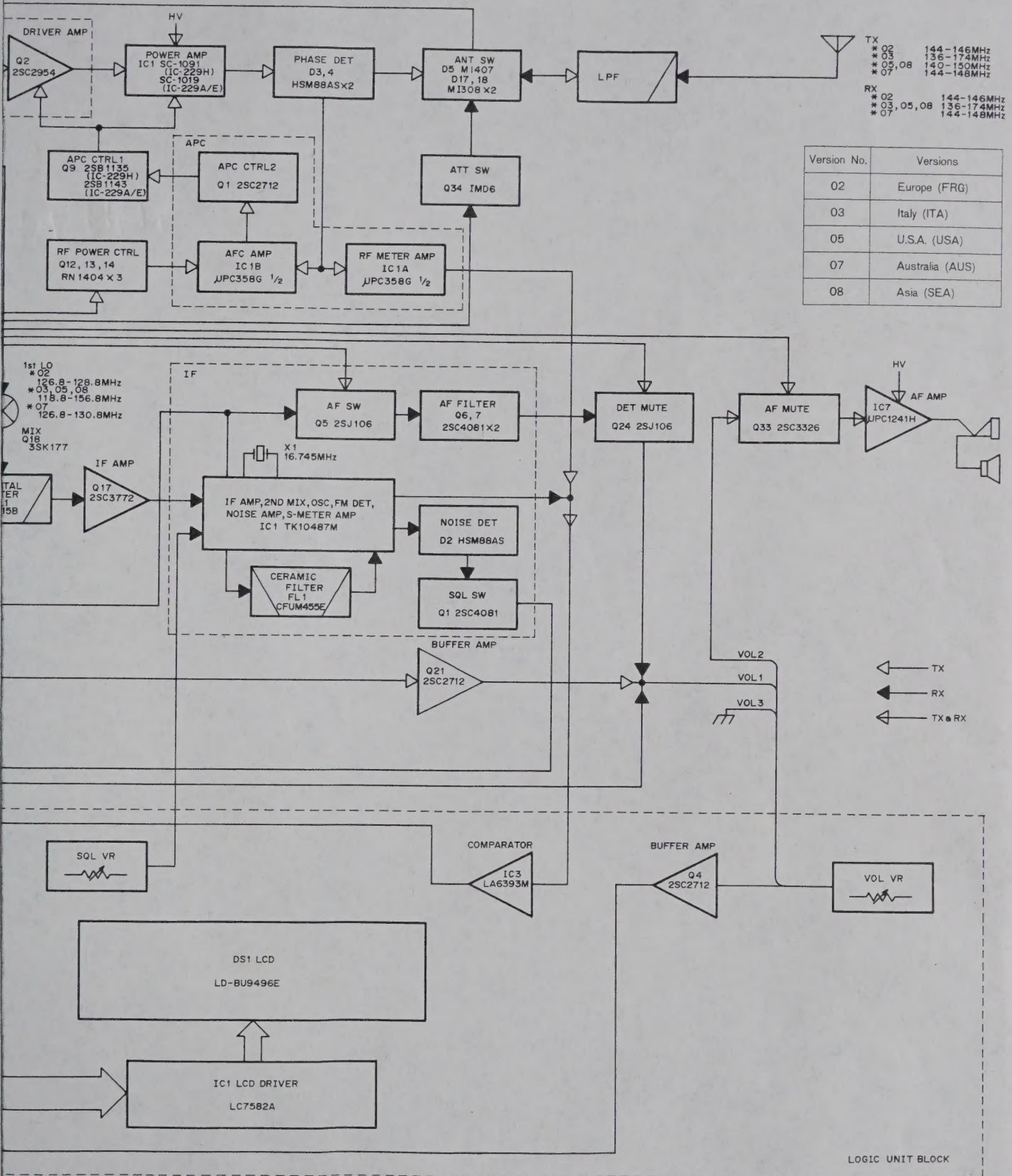
SCHEMATIC DIAGRAM

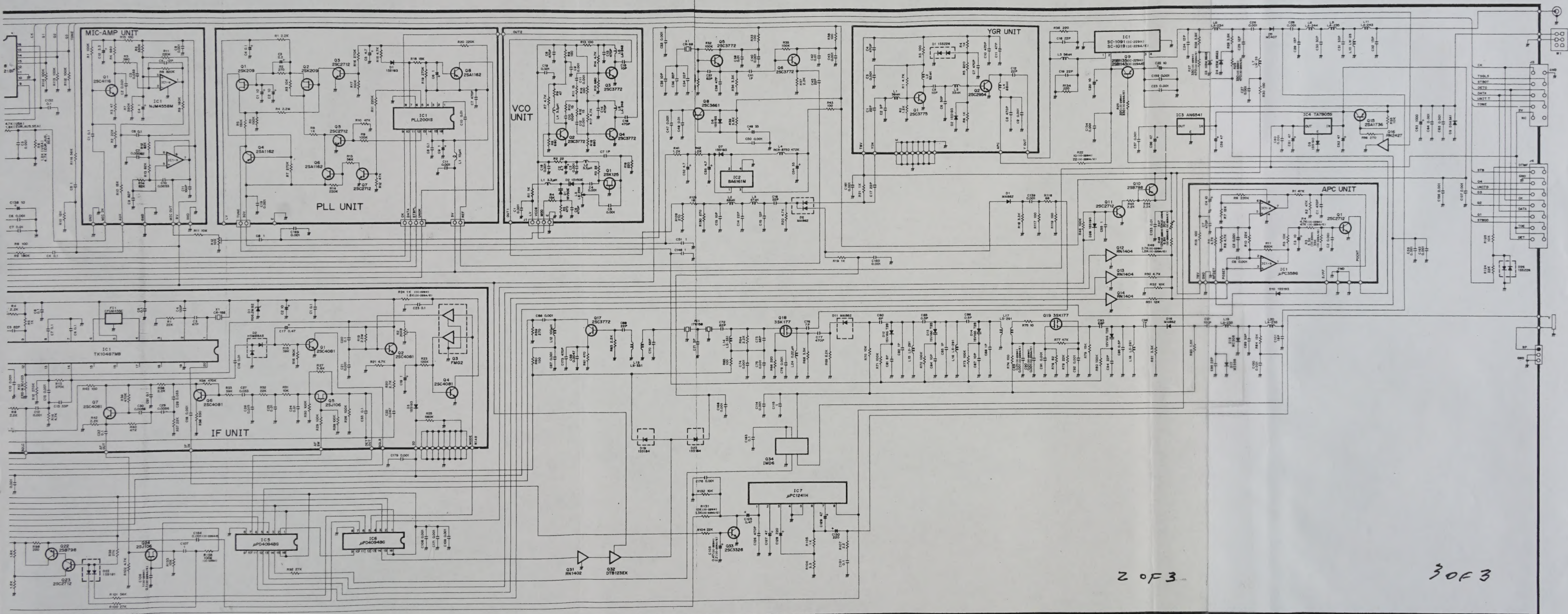


To upgrade quality, some components may be subject to change without notice.



BLOCK DIAG. (CONT)





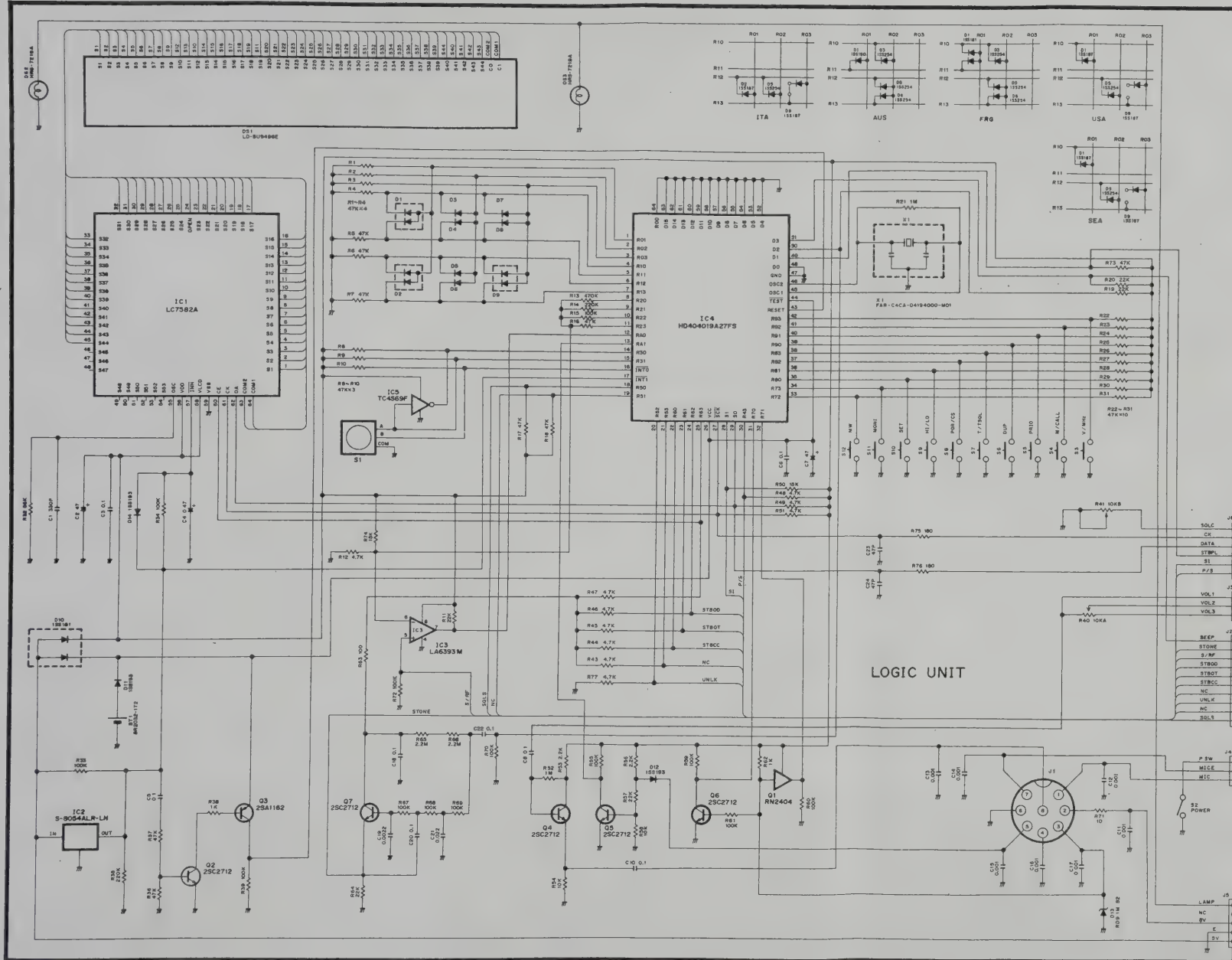
2 of 3

3 of 3

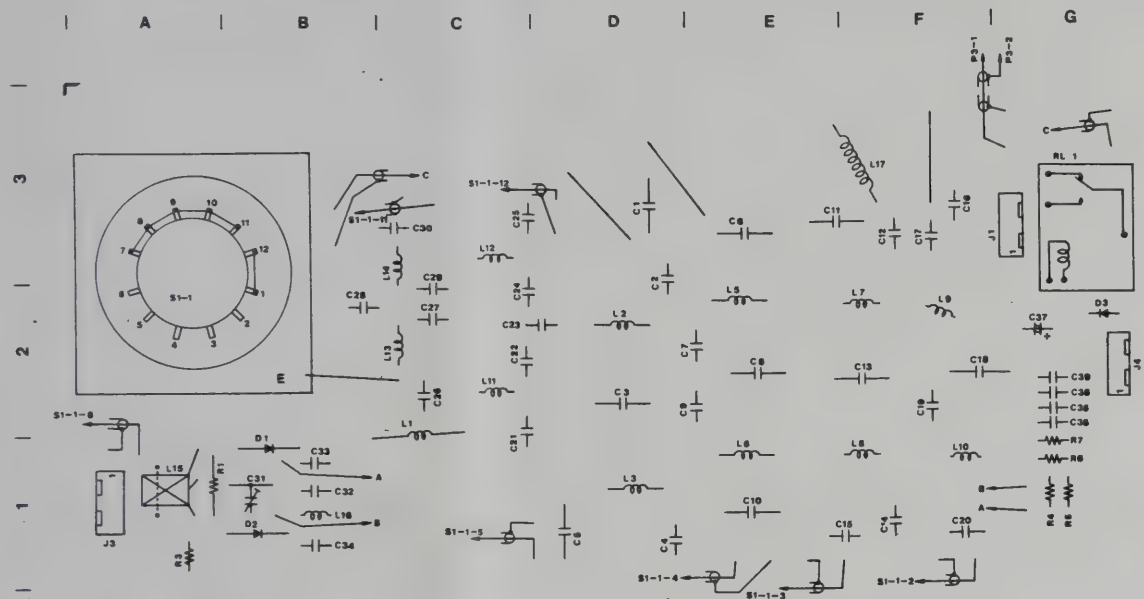
To upgrade quality, some components may be subject to change without notice.

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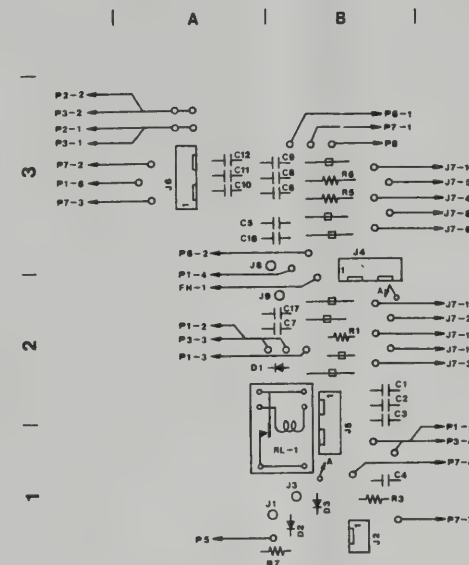
Icom Inc.



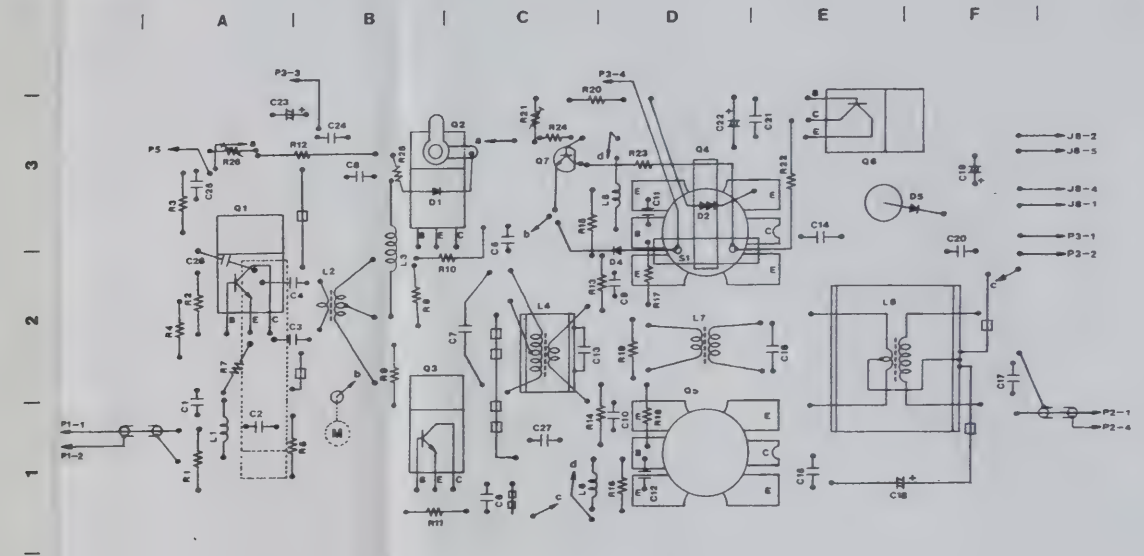
FILTER UNIT



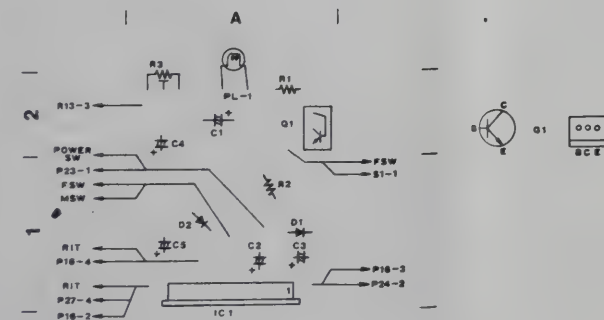
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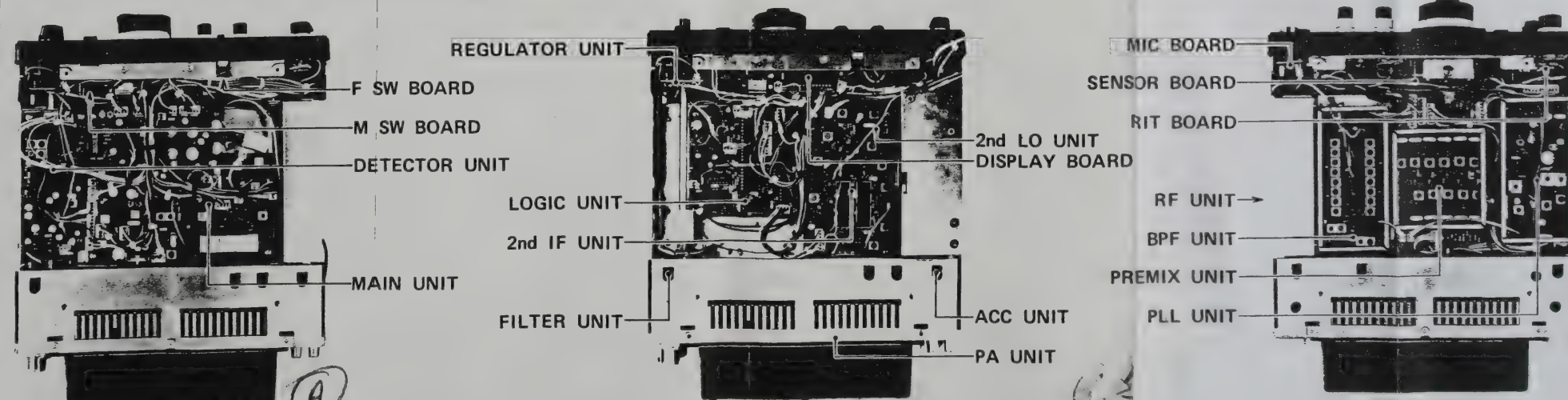
PA UNIT UNIT



REGULATOR UNIT



UNIT LAYOUT

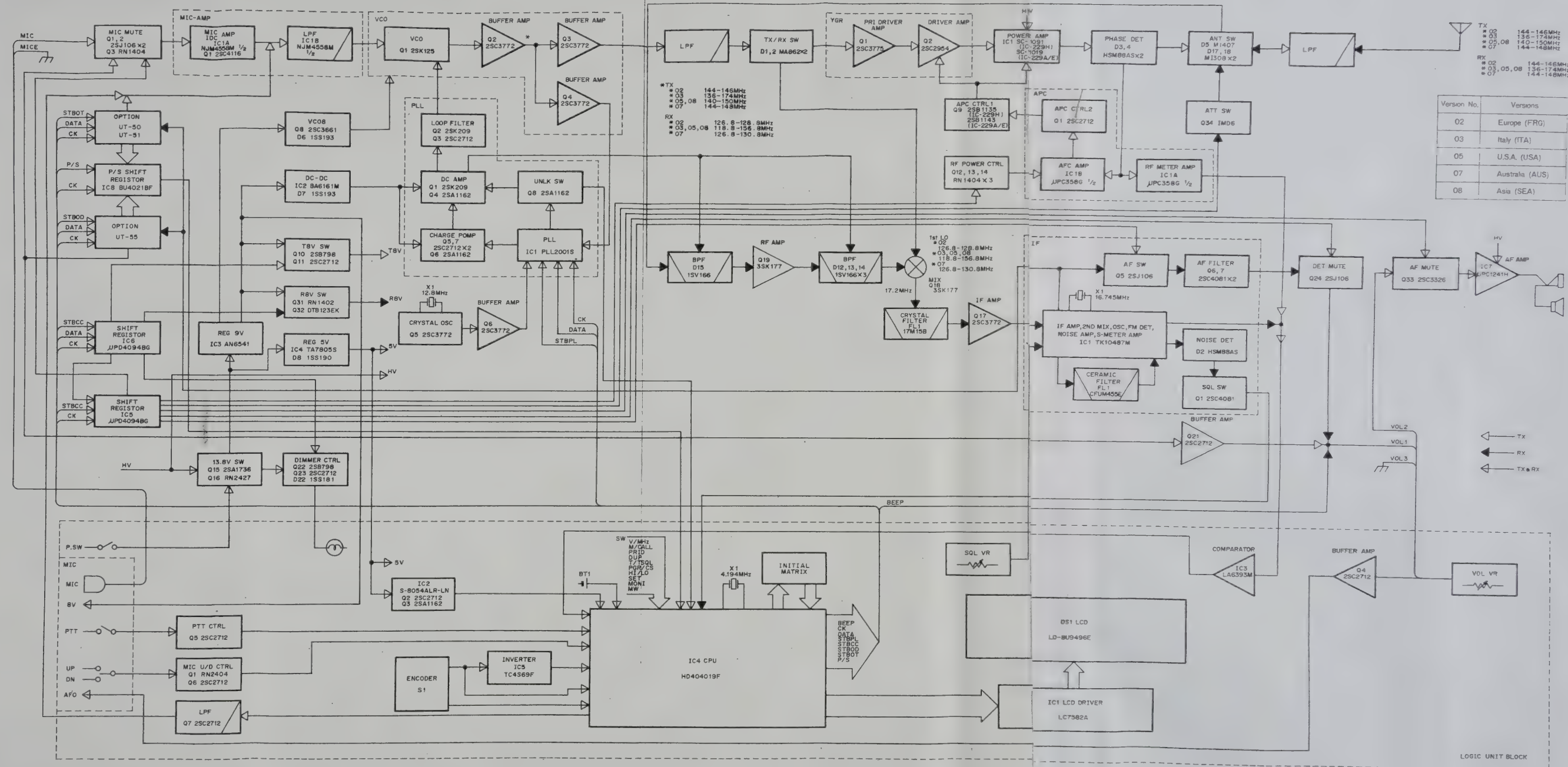
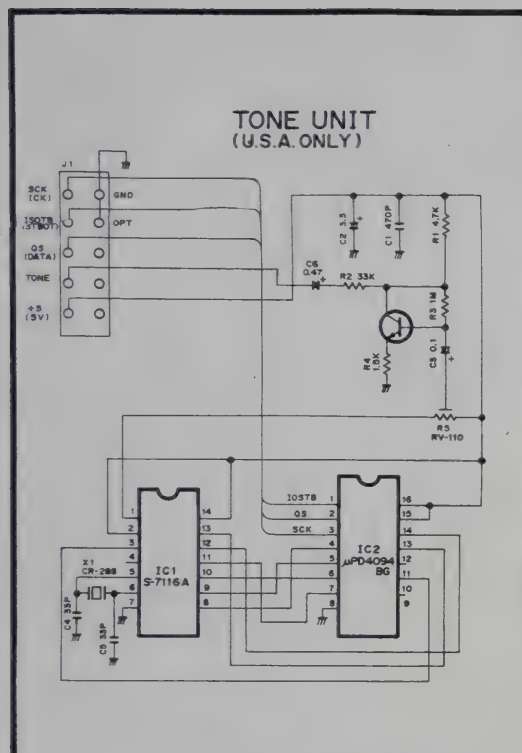


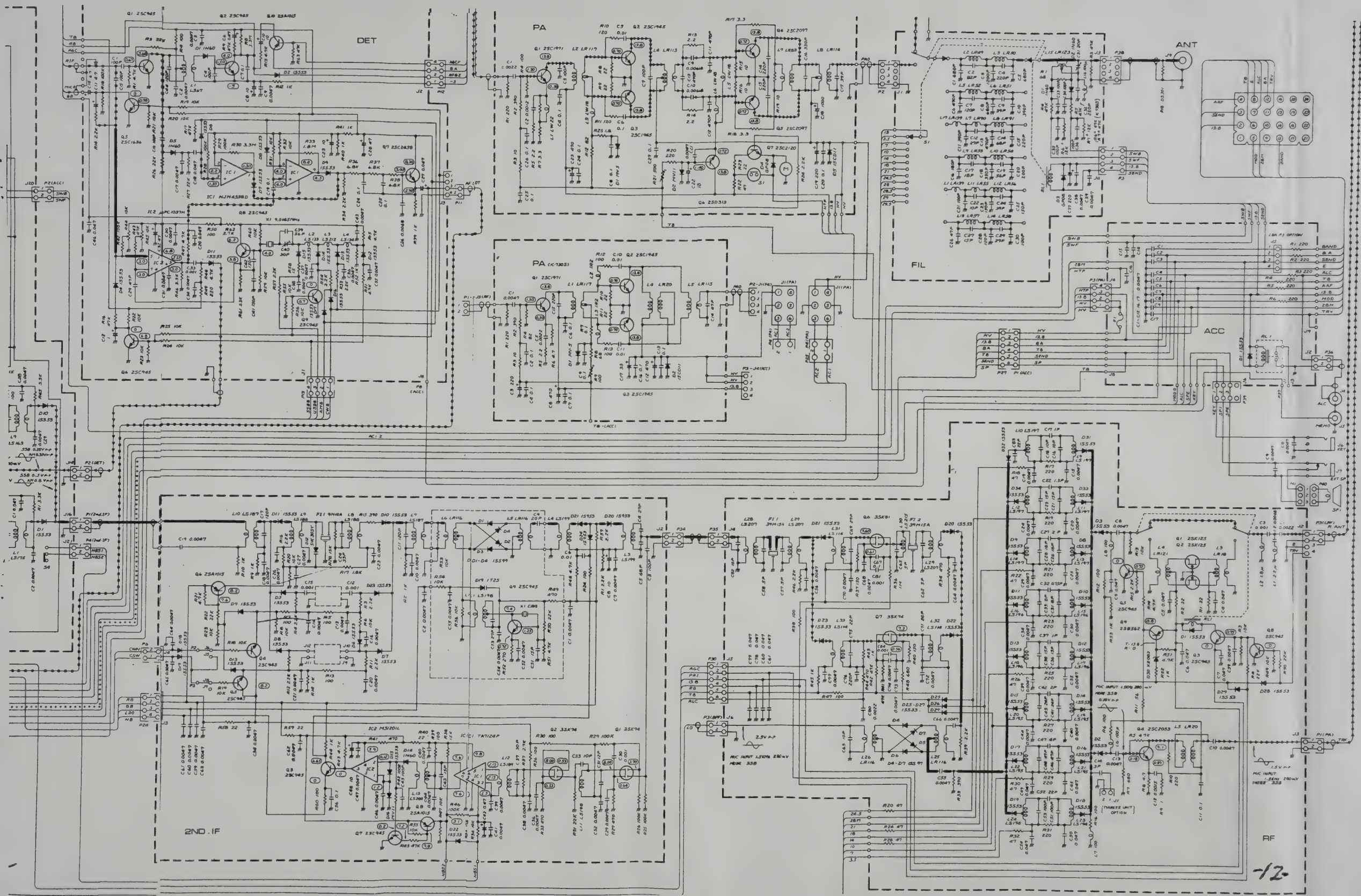
ICOM INCORPORATED

Some components subject to
for an improvement without

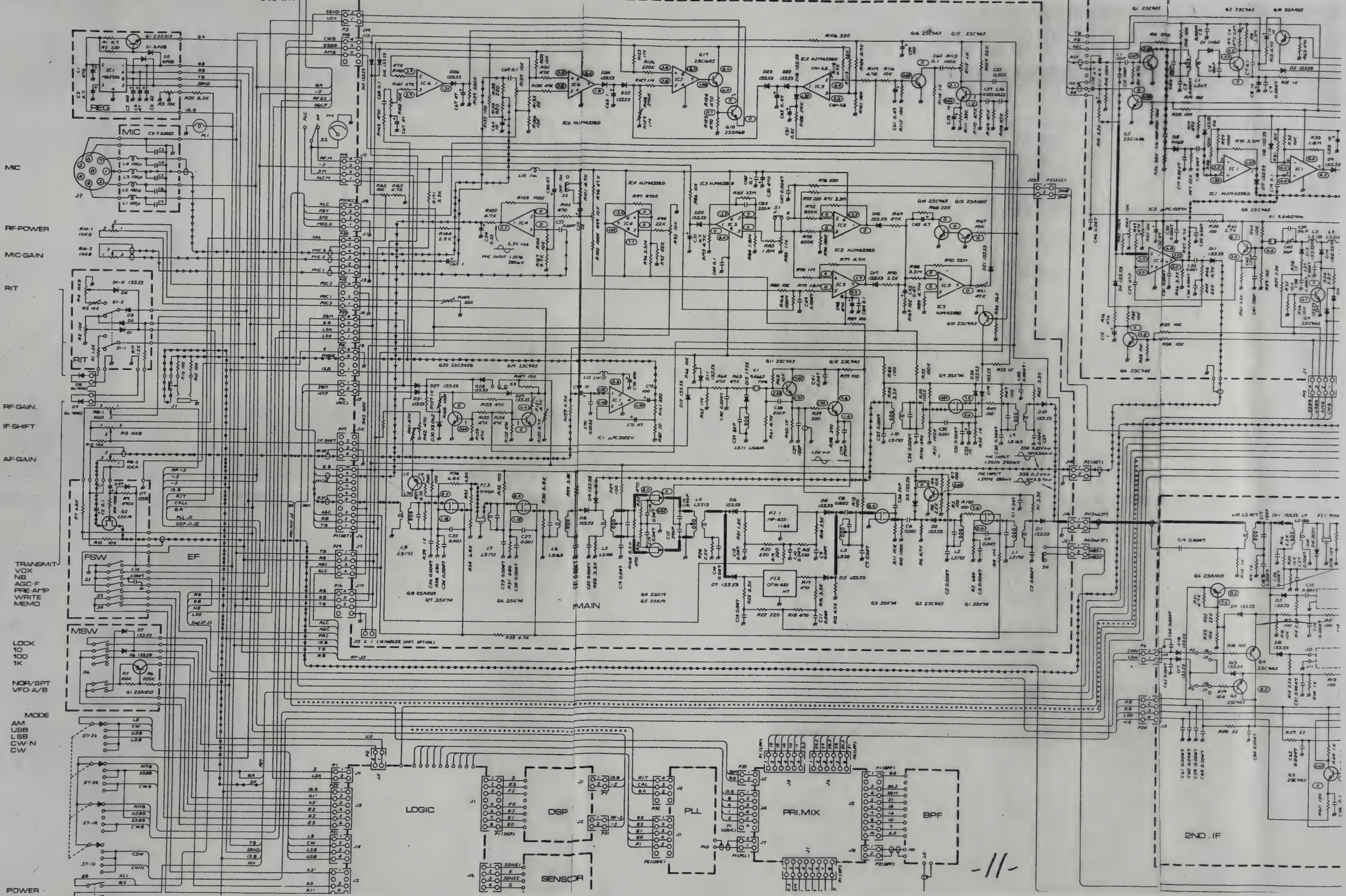
BLOCK DIAG.
(CONT)

BLOCK DIAGRAM





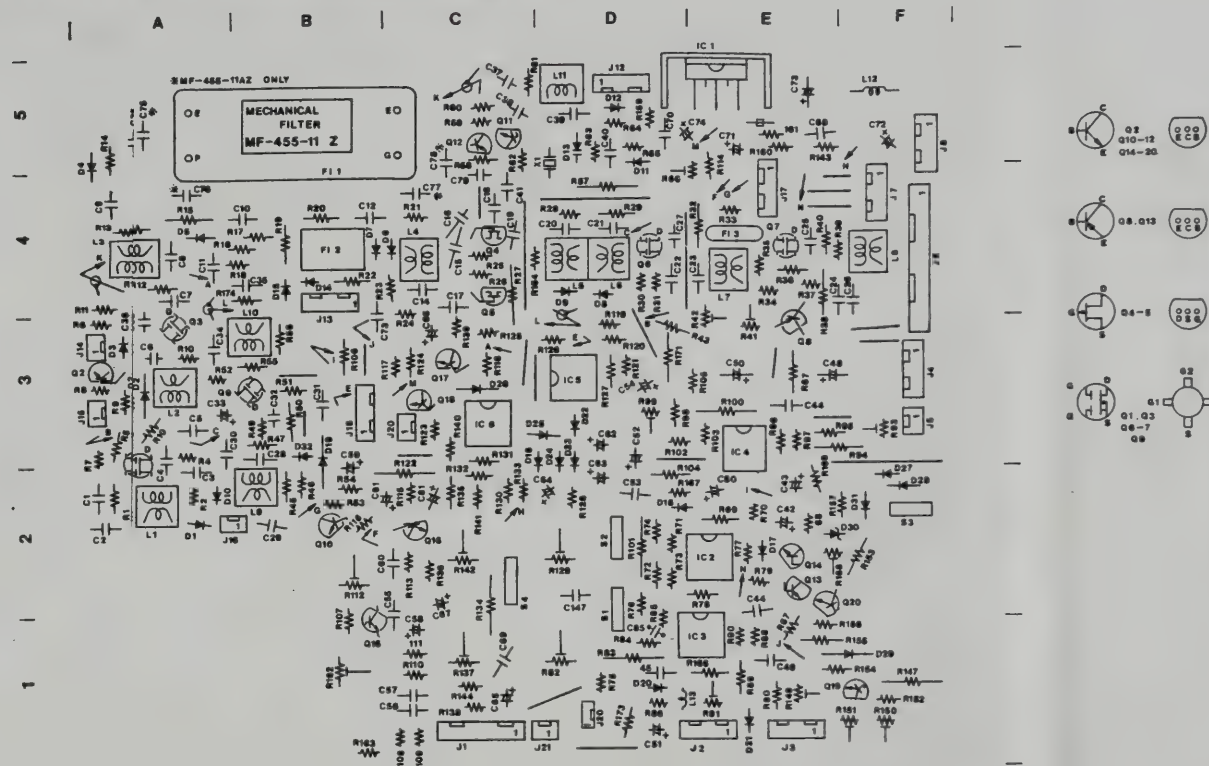
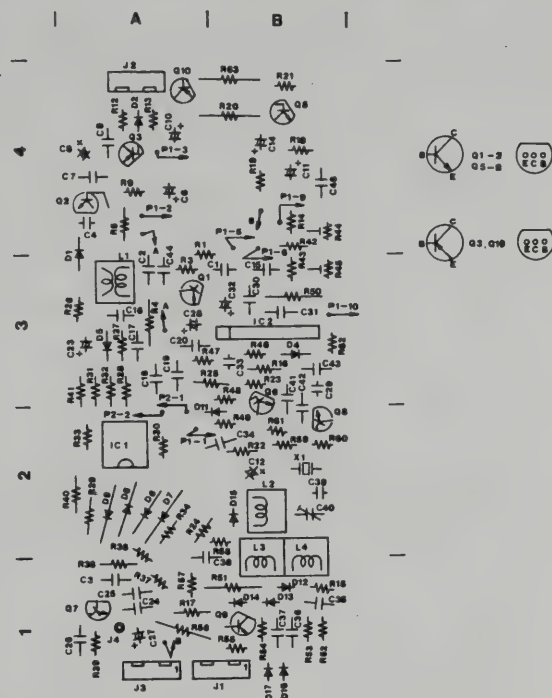
POWER •



DETECTOR UNIT

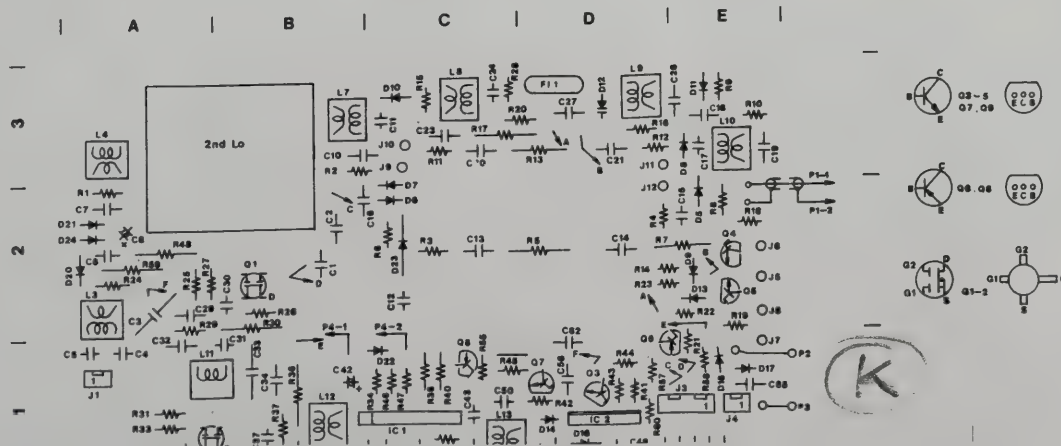
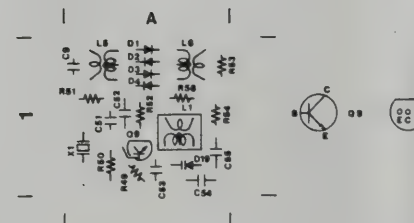
The schematic diagram illustrates the internal circuitry of a DETECTOR UNIT, divided into two main sections, A and B. The diagram includes a variety of electronic components and their interconnections:

- Section A (Left):** Features a transformer (J2) at the top, followed by a series of resistors (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100) and capacitors (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100). It also includes a variable capacitor (P1-3) and a variable inductor (P1-4).
- Section B (Right):** Features a transformer (J1) at the top, followed by a series of resistors (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100) and capacitors (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100). It also includes a variable capacitor (P1-5) and a variable inductor (P1-6).
- Other Components:** The diagram includes several other components such as diodes (D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24, D25, D26, D27, D28, D29, D30, D31, D32, D33, D34, D35, D36, D37, D38, D39, D40, D41, D42, D43, D44, D45, D46, D47, D48, D49, D50, D51, D52, D53, D54, D55, D56, D57, D58, D59, D60, D61, D62, D63, D64, D65, D66, D67, D68, D69, D70, D71, D72, D73, D74, D75, D76, D77, D78, D79, D80, D81, D82, D83, D84, D85, D86, D87, D88, D89, D90, D91, D92, D93, D94, D95, D96, D97, D98, D99, D100), inductors (L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22, L23, L24, L25, L26, L27, L28, L29, L30, L31, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L42, L43, L44, L45, L46, L47, L48, L49, L50, L51, L52, L53, L54, L55, L56, L57, L58, L59, L60, L61, L62, L63, L64, L65, L66, L67, L68, L69, L70, L71, L72, L73, L74, L75, L76, L77, L78, L79, L80, L81, L82, L83, L84, L85, L86, L87, L88, L89, L90, L91, L92, L93, L94, L95, L96, L97, L98, L99, L100), and a variable capacitor (P1-7).

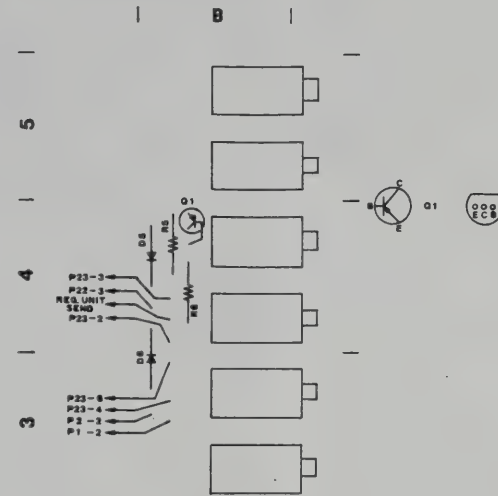
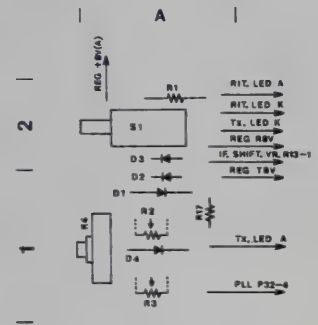


The schematic diagram illustrates the internal circuitry of the 2nd IF Unit. It is organized into five vertical sections labeled A, B, C, D, and E, and three horizontal sections labeled 1, 2, and 3. The diagram includes the following components and connections:

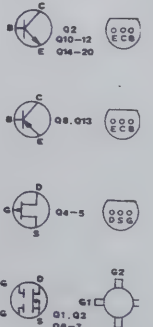
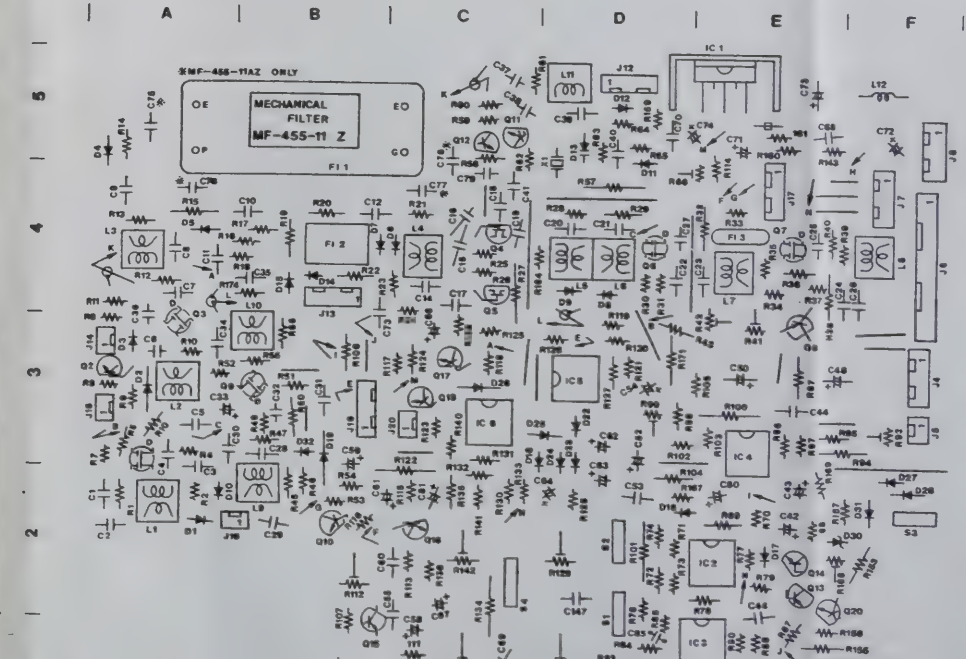
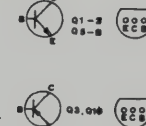
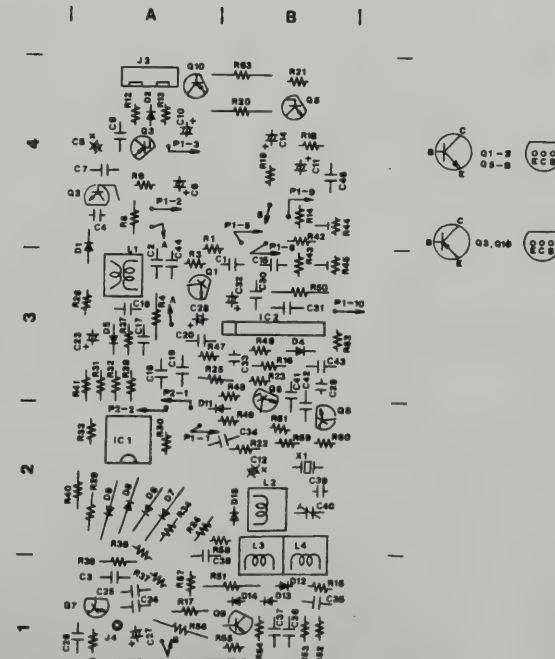
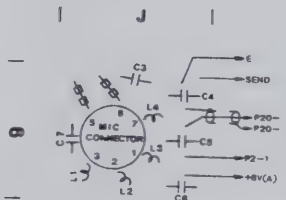
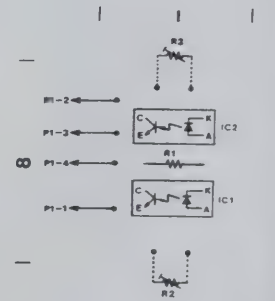
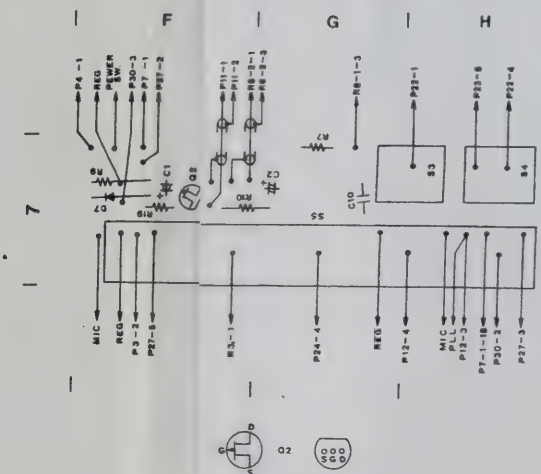
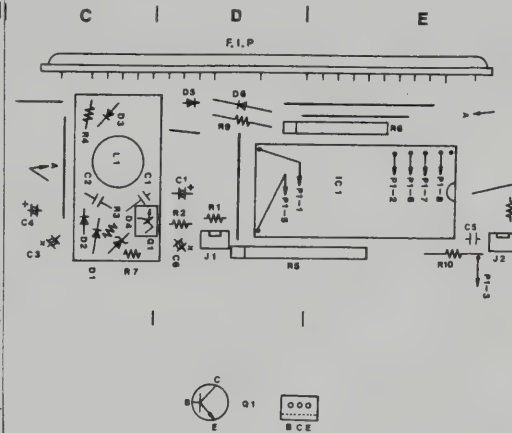
- Section A:** Contains a 2nd LO (Local Oscillator) block, a 2nd IF (Intermediate Frequency) transformer, and various resistors (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100) and capacitors (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100).
- Section B:** Contains a 2nd IF transformer, a 2nd IF transformer, and various resistors (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100) and capacitors (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100).
- Section C:** Contains a 2nd IF transformer, a 2nd IF transformer, and various resistors (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100) and capacitors (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100).
- Section D:** Contains a 2nd IF transformer, a 2nd IF transformer, and various resistors (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100) and capacitors (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100).
- Section E:** Contains a 2nd IF transformer, a 2nd IF transformer, and various resistors (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100) and capacitors (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71

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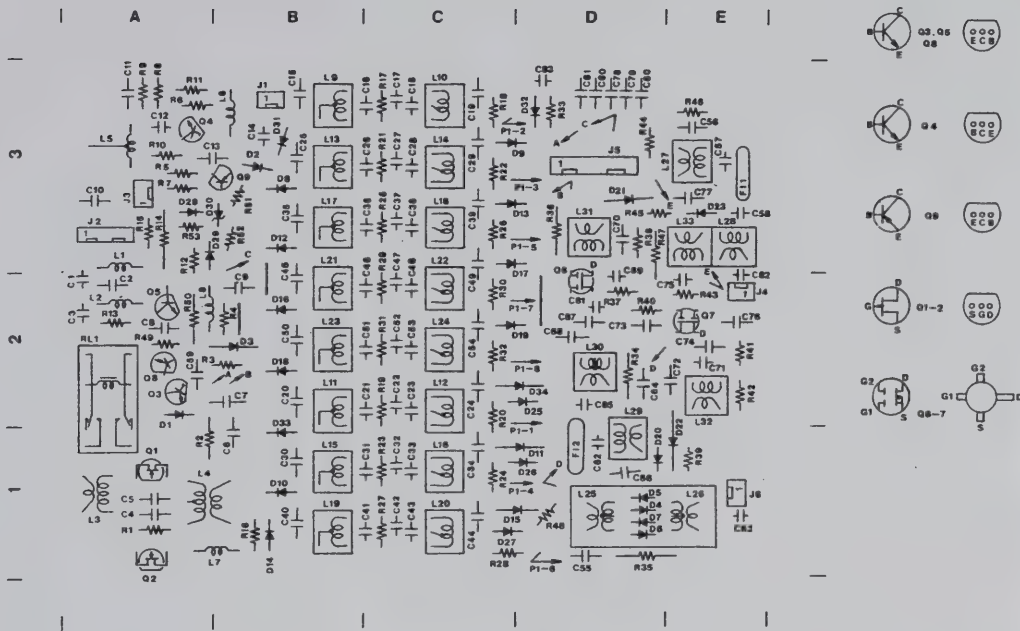
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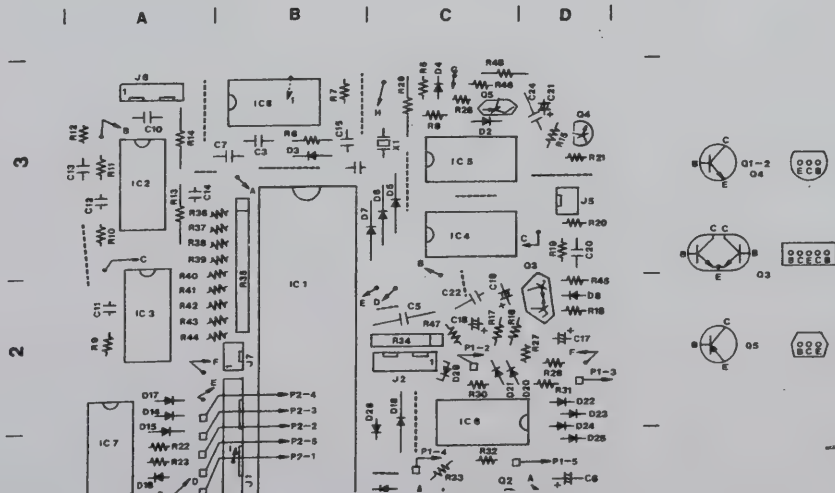
- MIC BOARD



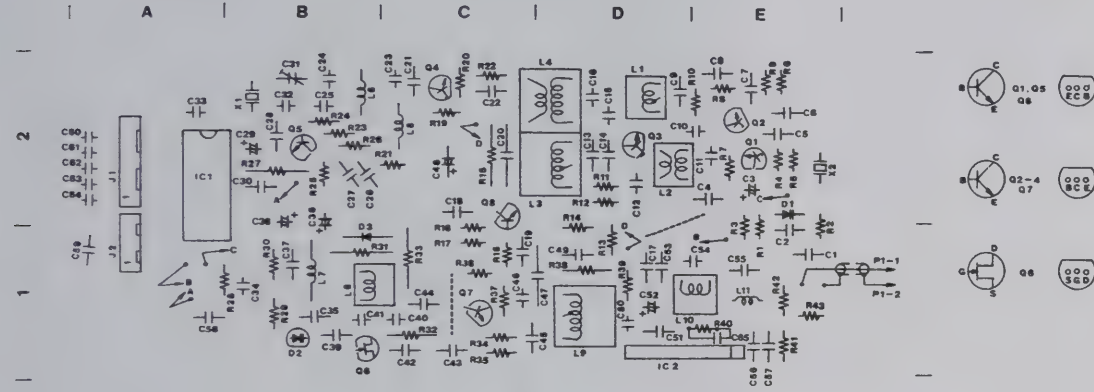
RF UNIT



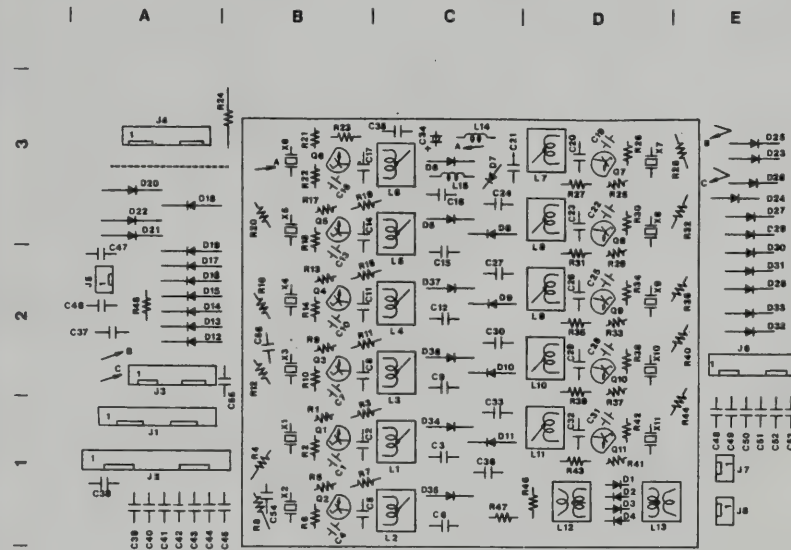
LOGIC UNIT



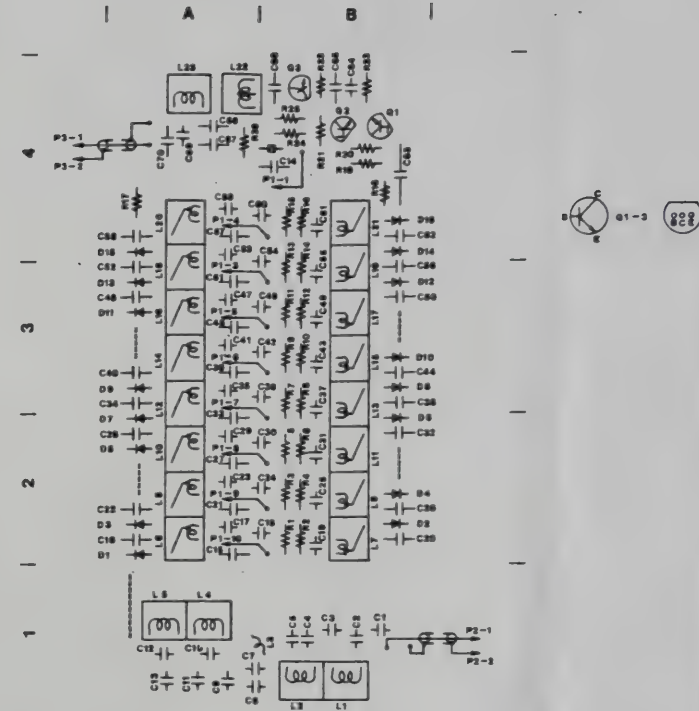
PLL UNIT



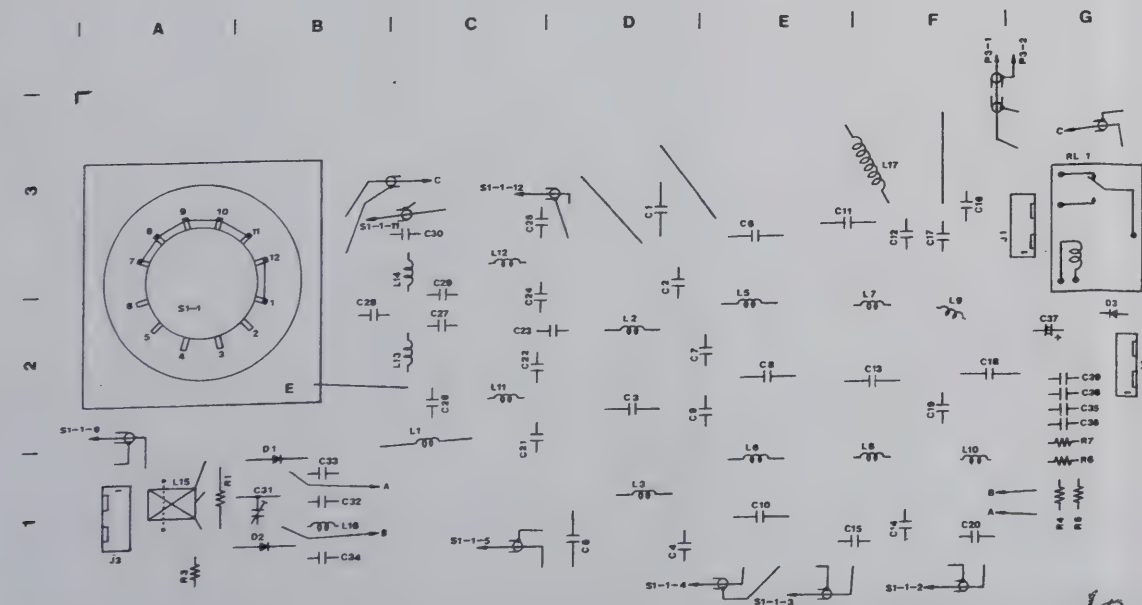
PREMIX UNIT



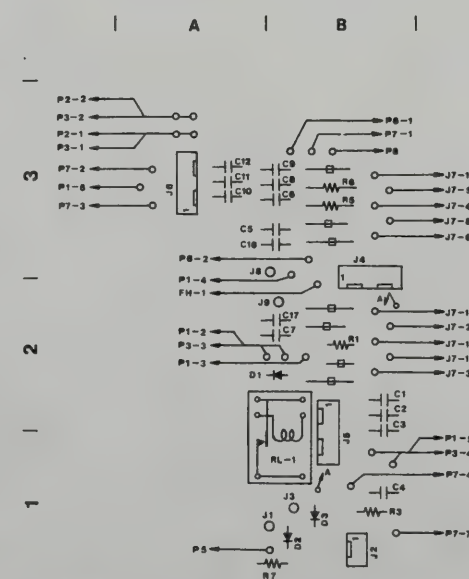
LPF UNIT



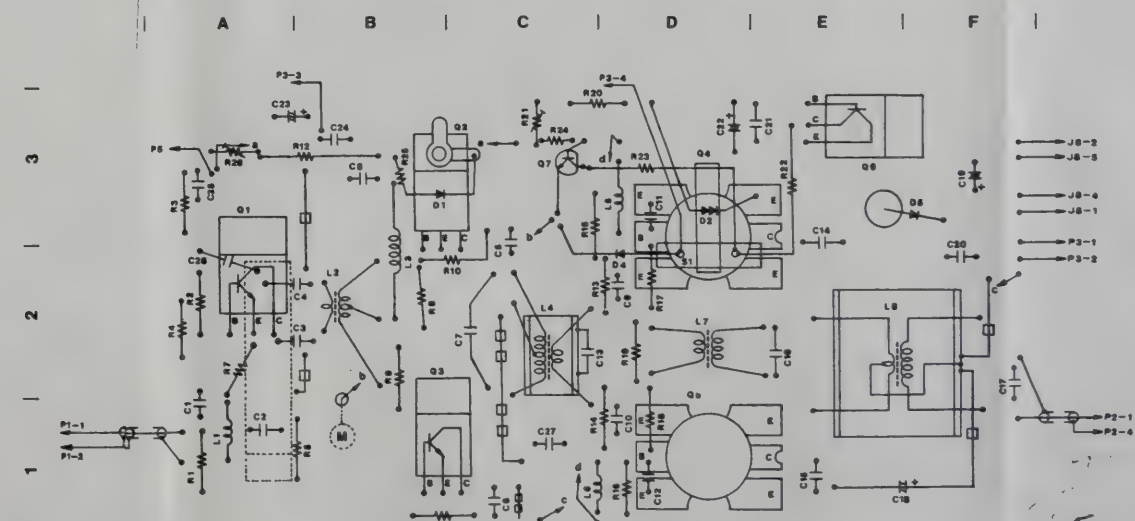
FILTER UNIT

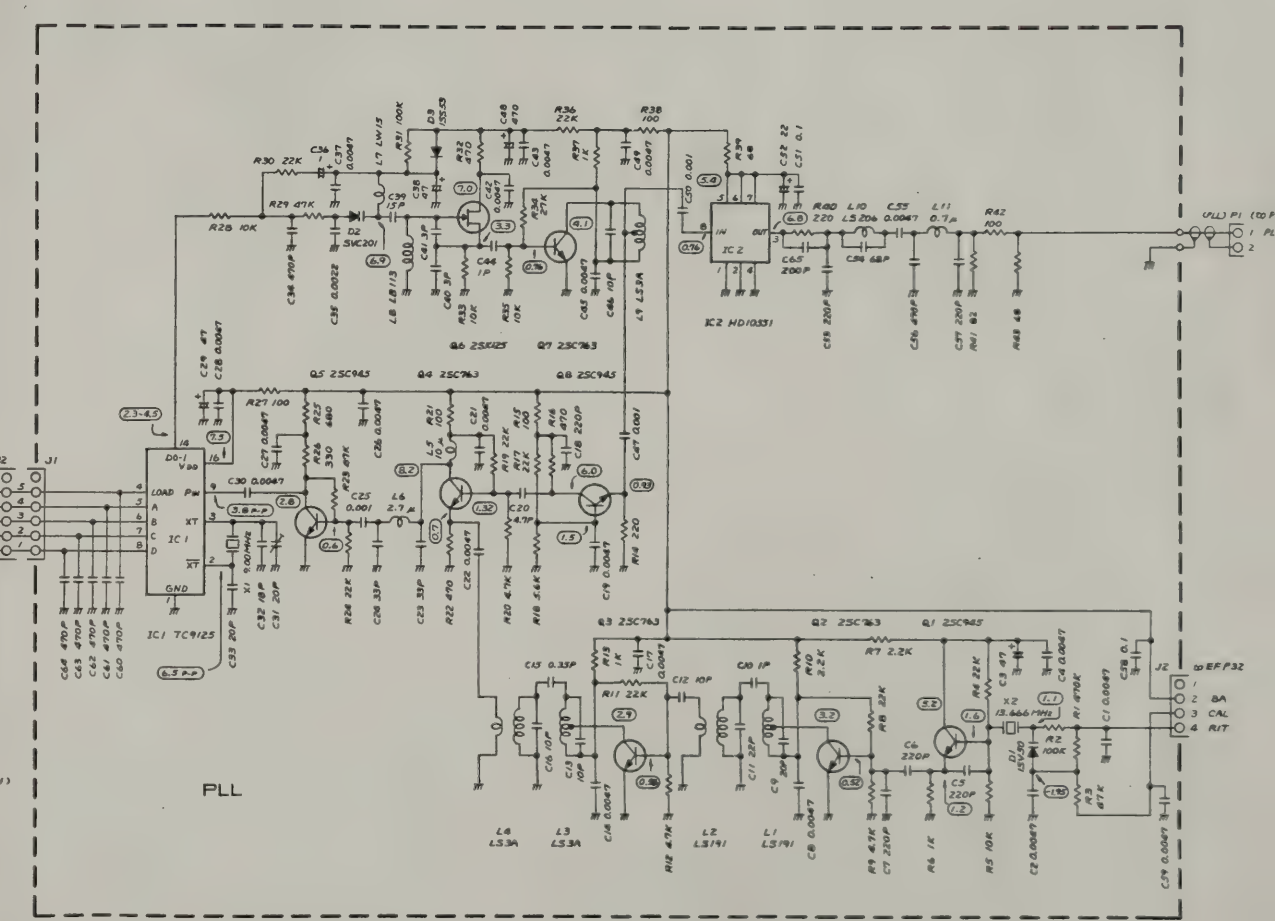
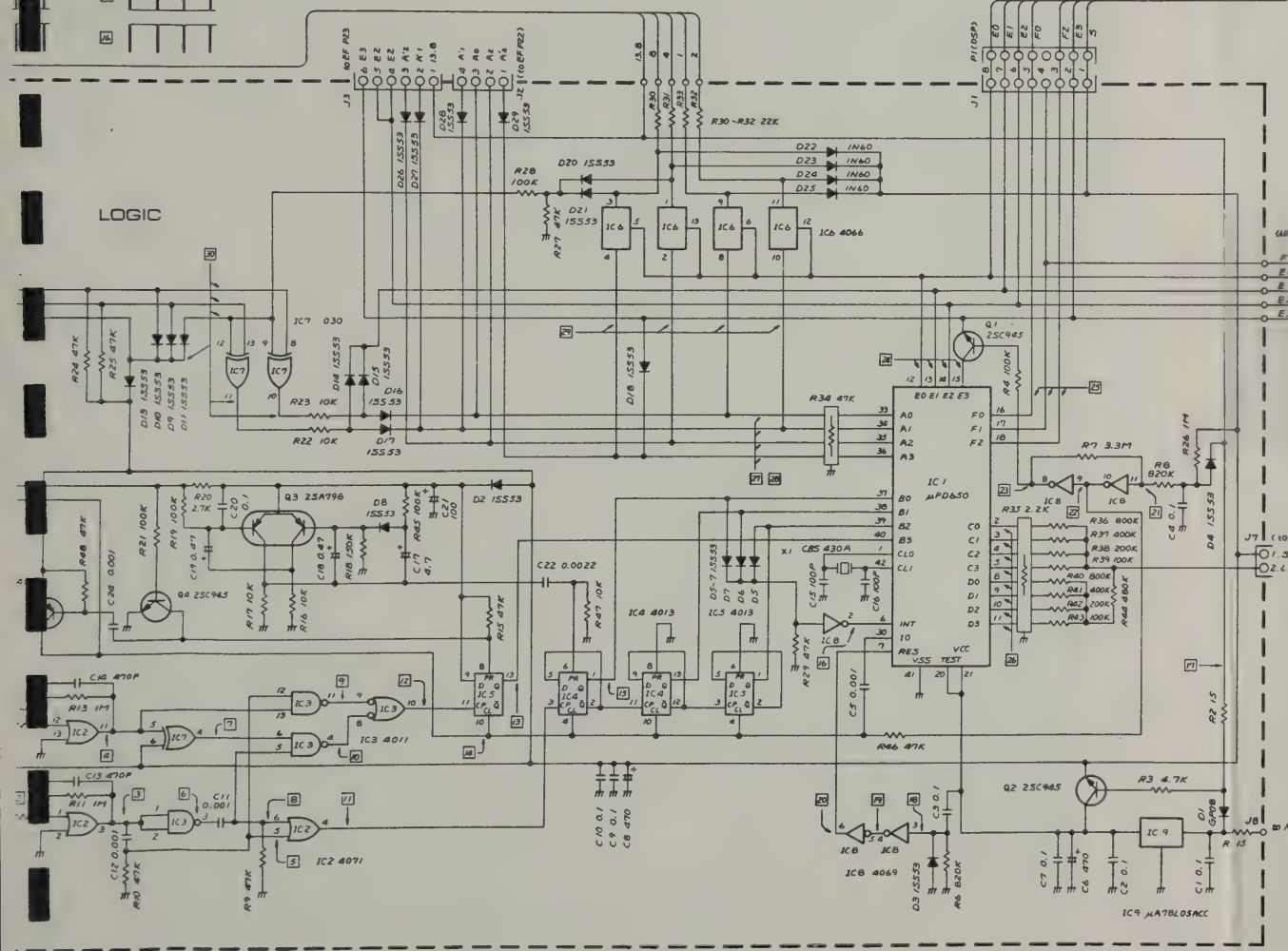


AGC UNIT



PA UNIT





MODE SW

BAND	MODE	J4 -2	J4 -3	J4 .4	IC7 .0	IC7 -9	IC7 -13	IC7 -10	IC7 -11
3.5 MHz	CW	L	L	L	L	L	L	L	L
7 MHz	USB	M	L	M	M	L	L	M	L
	USB	M	M	L	L	L	M	L	M
10 MHz	CW	L	L	L	L	L	L	L	L
20 MHz	USB	M	L	M	M	M	L	L	M
	USB	M	M	L	L	M	M	M	L

MODE SW

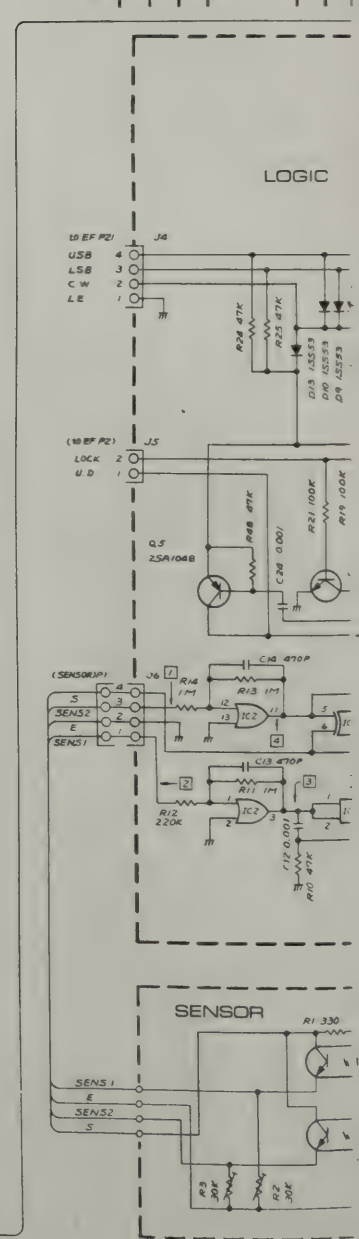
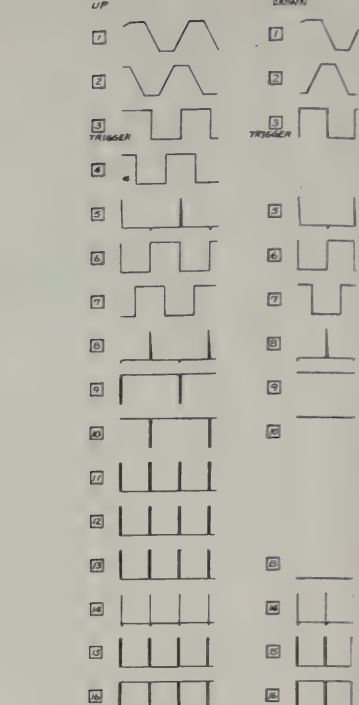
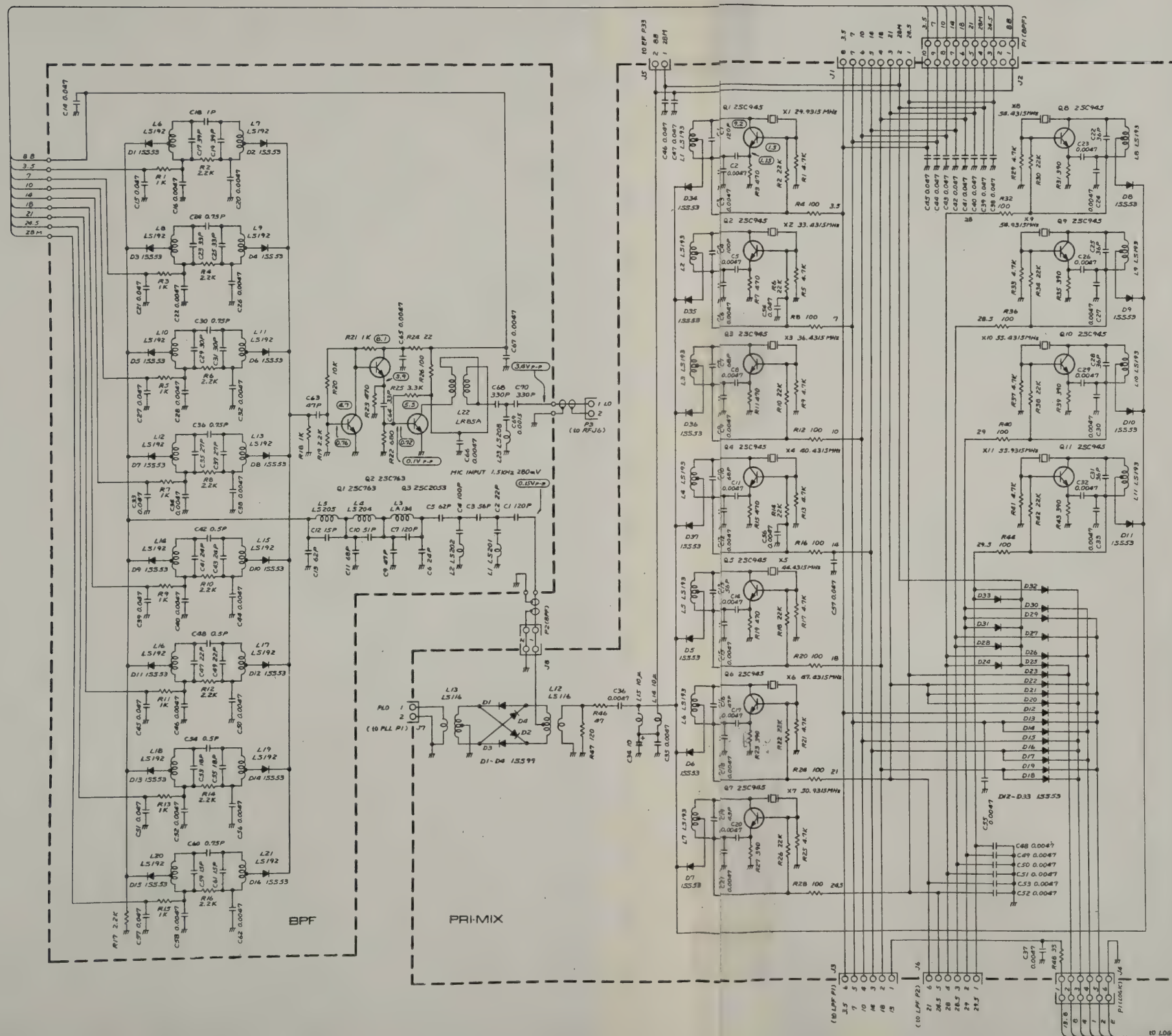
BAND	IC6 9.0	IC6 11.0	IC6 1.2	IC6 3.4
3.5 MHz	L	M	L	M
7	M	L	M	L
10	L	L	M	L
14	M	M	L	M
18	L	M	M	L
21	M	M	M	L
26.5	L	L	L	M
28	M	L	L	M
28.5	L	M	L	M
29	M	L	M	M
29.5	L	L	M	M
N/C	L	L	L	M

IC1-12 (80) TRIGGER

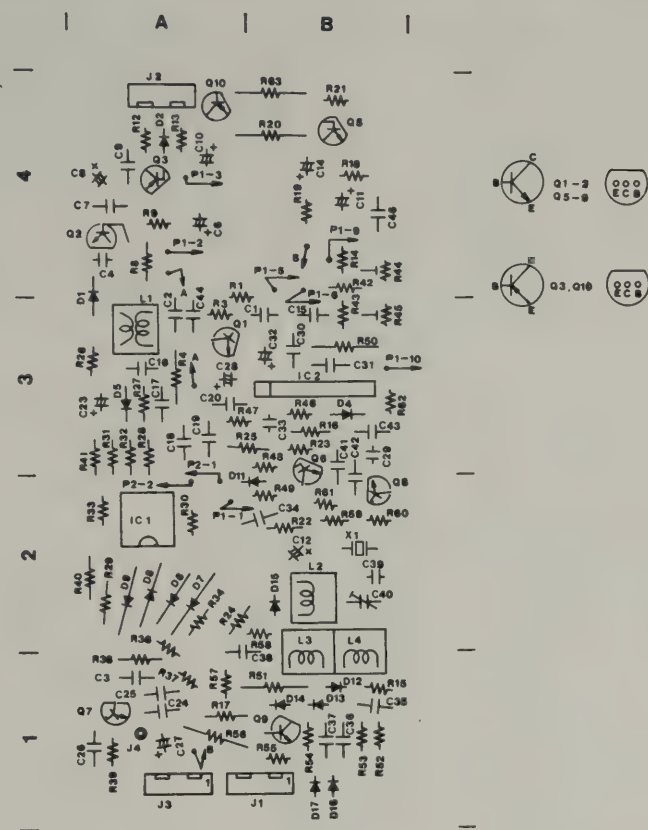
IC1-12 (80) TRIGGER

IC1-12 (80) TRIGGER

1.0 μs



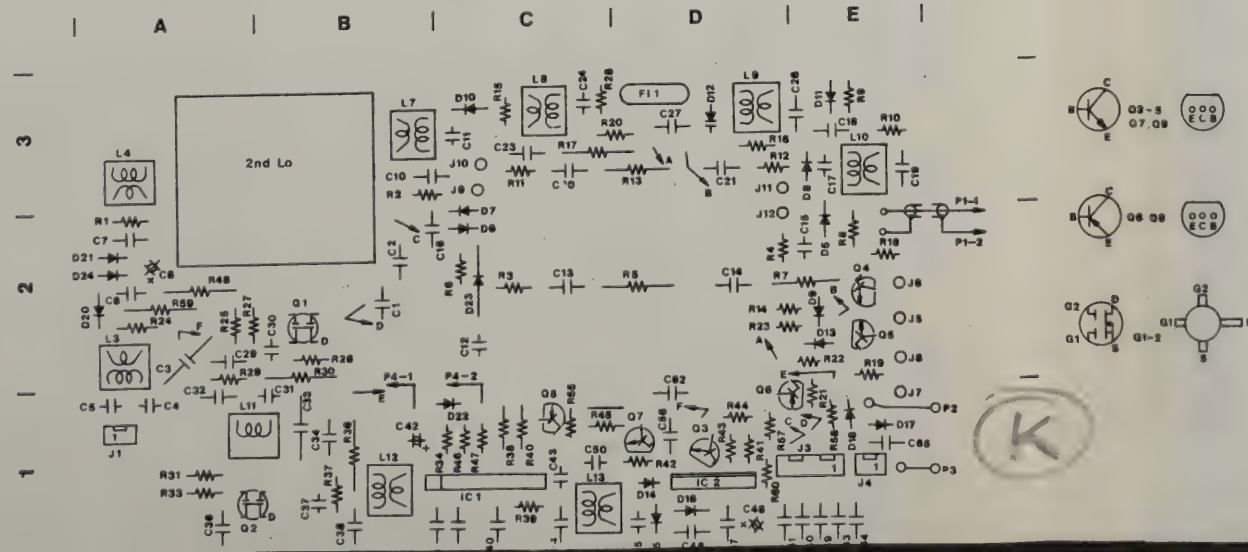
DETECTOR UNIT



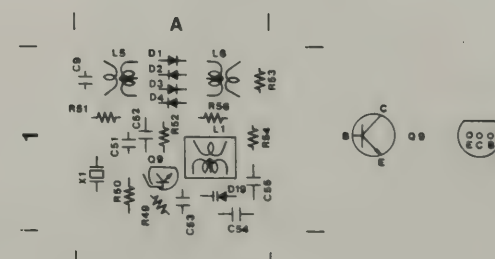
MAIN UNIT



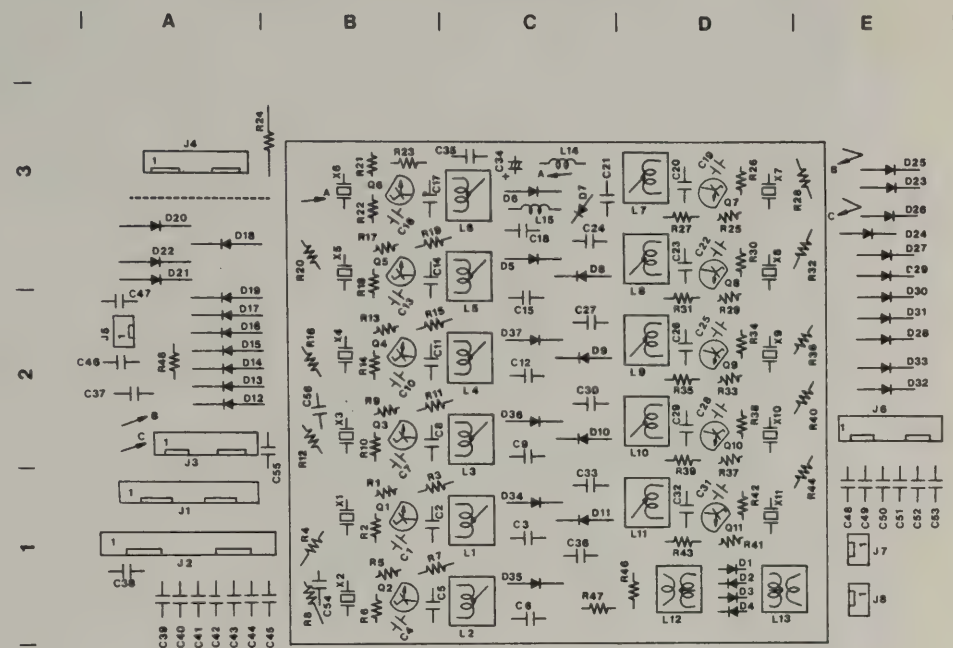
2ND IF UNIT



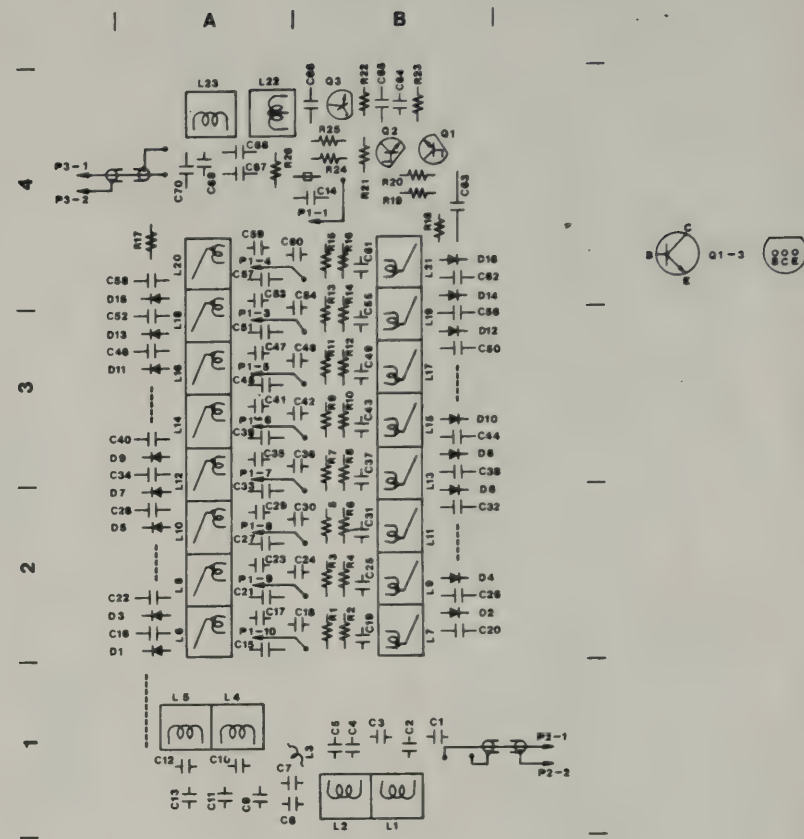
2ND LO UNIT



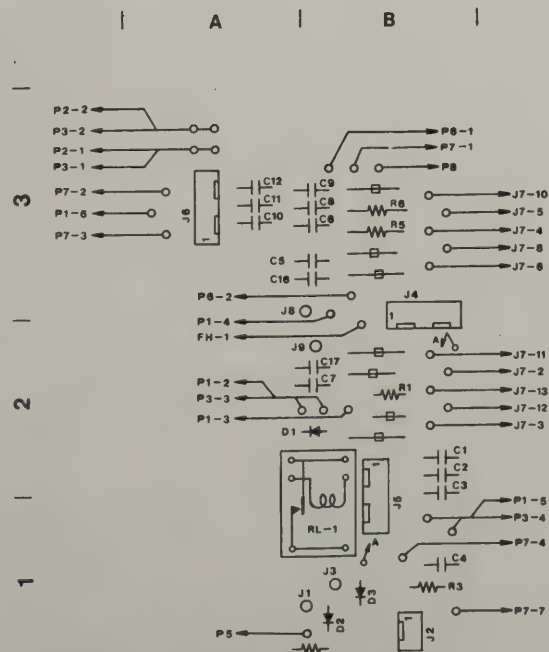
PREMIX UNIT



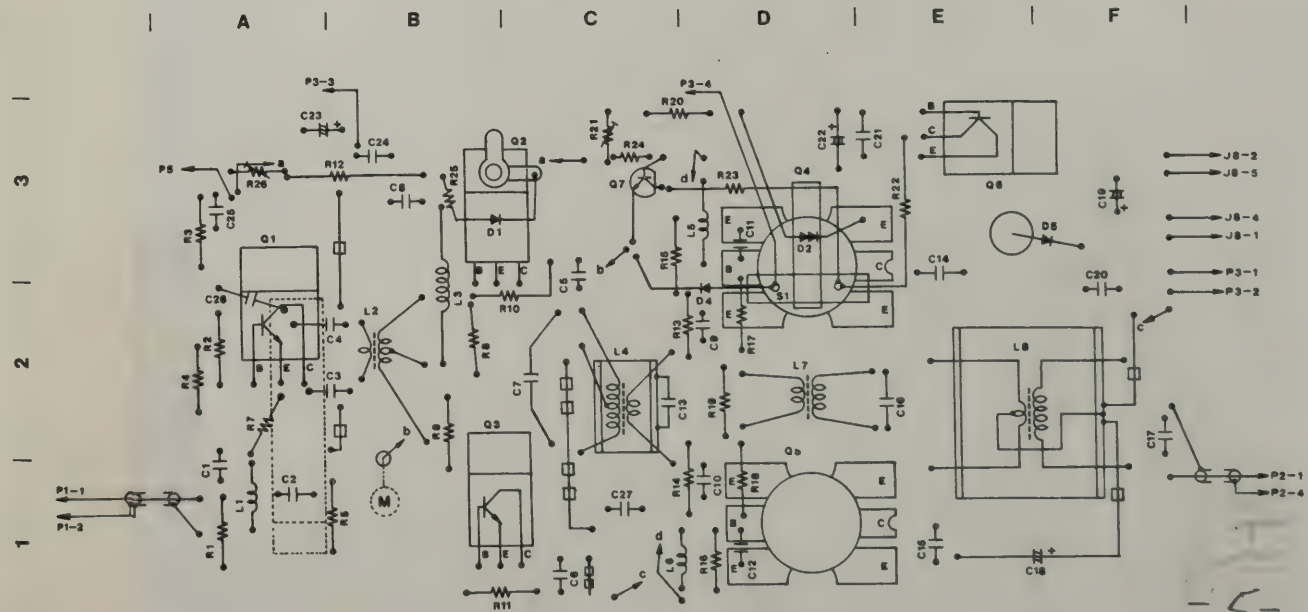
LPF UNIT



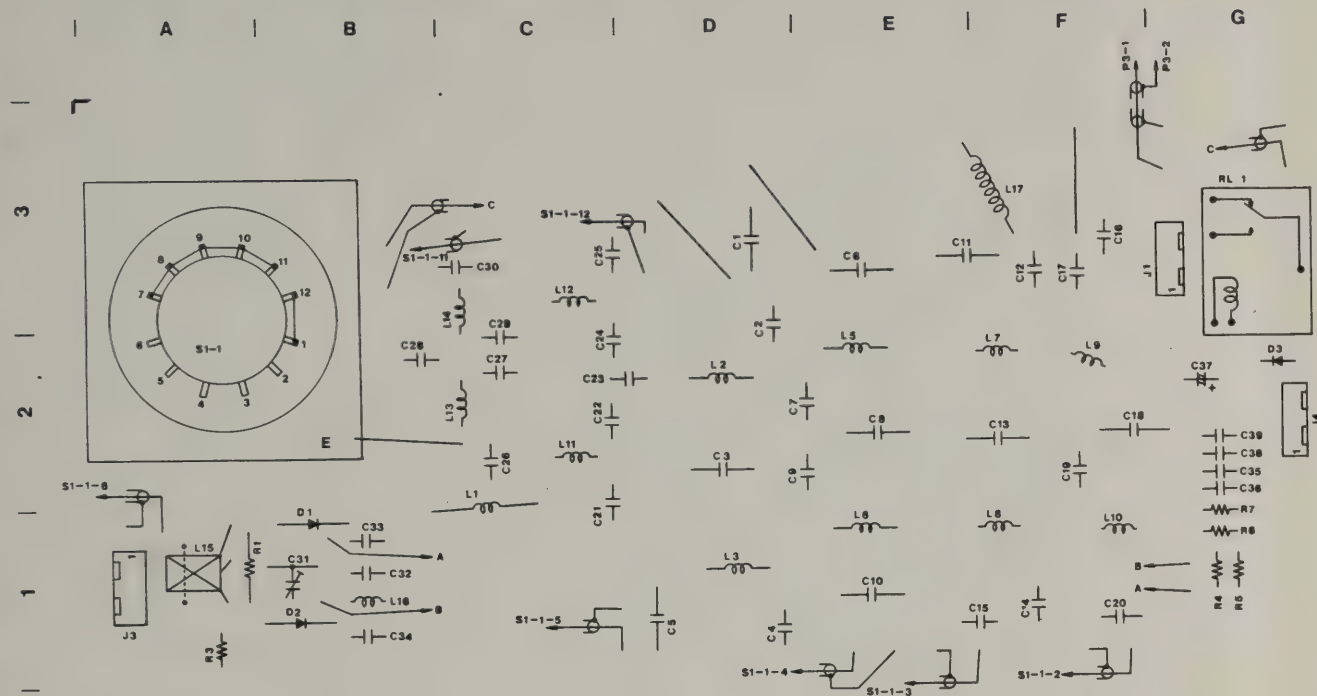
AGC UNIT



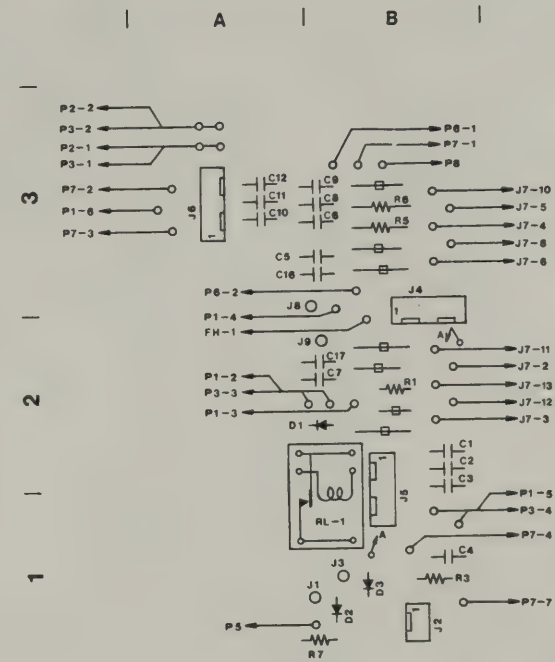
PA UNIT



FILTER UNIT



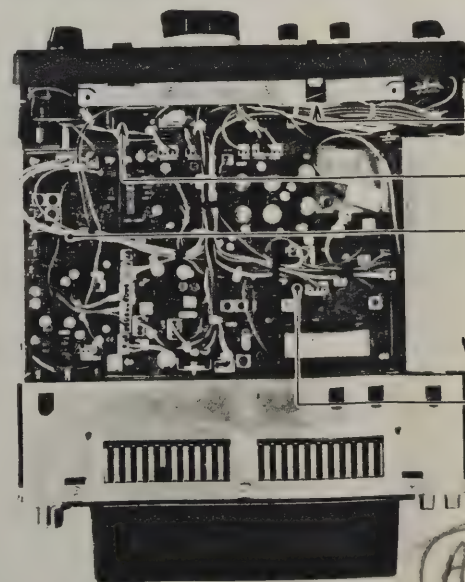
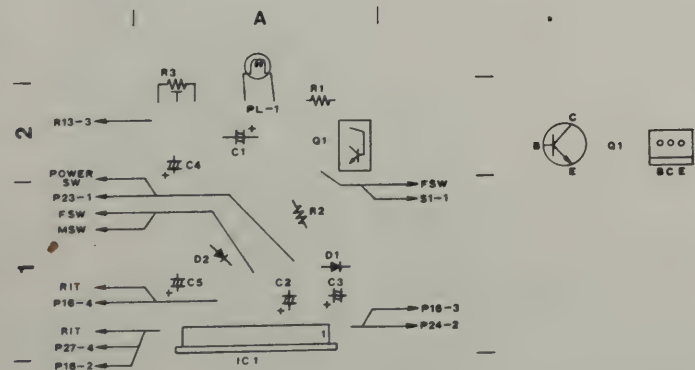
AGC UNIT



PA UNIT

P1-1
P1-2

REGULATOR UNIT

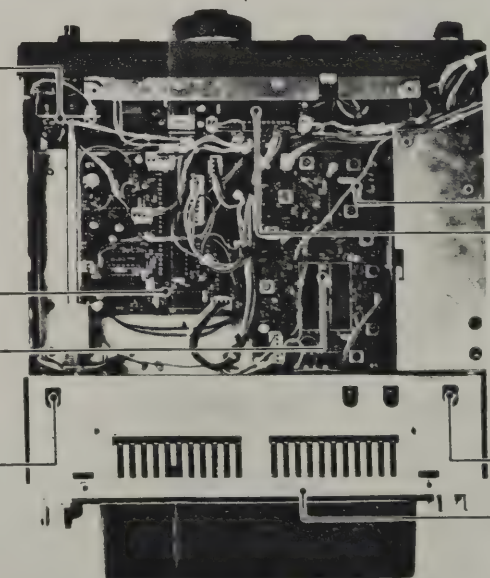


F SW BOARD
M SW BOARD
DETECTOR UNIT
MAIN UNIT

REGULATOR UNIT

LOGIC UNIT
2nd IF UNIT

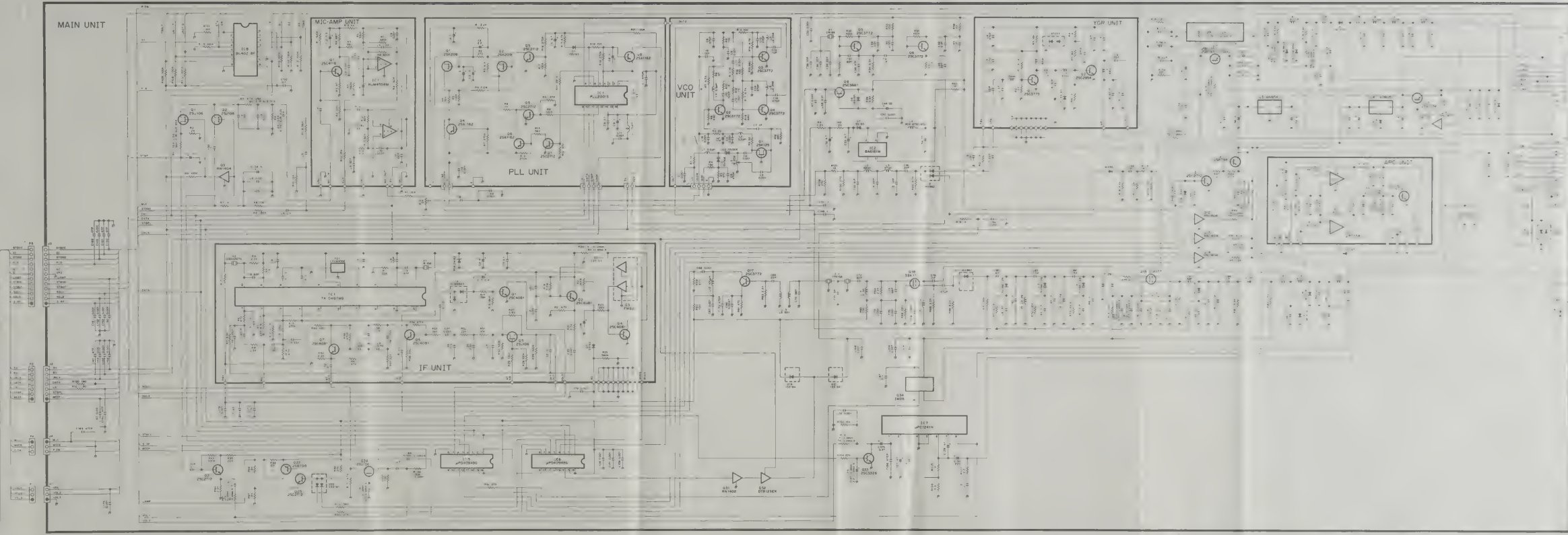
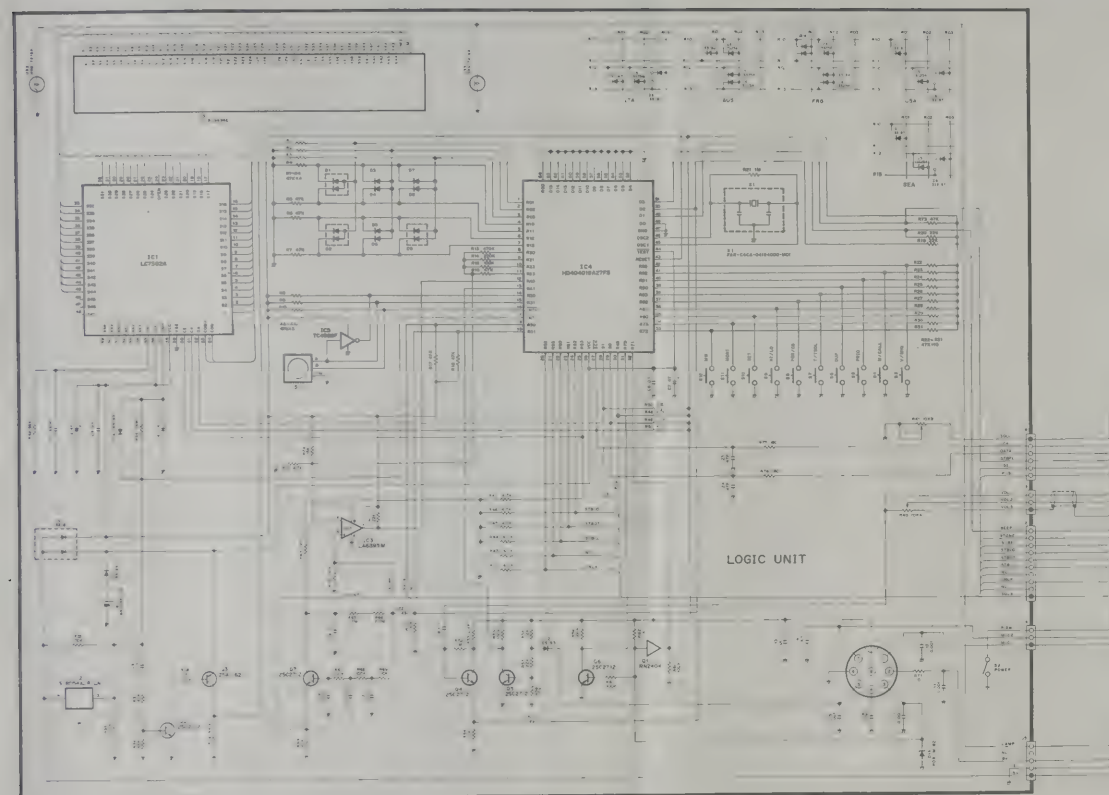
FILTER UNIT



2nd LO UNIT
DISPLAY BOARD
ACC UNIT
PA UNIT

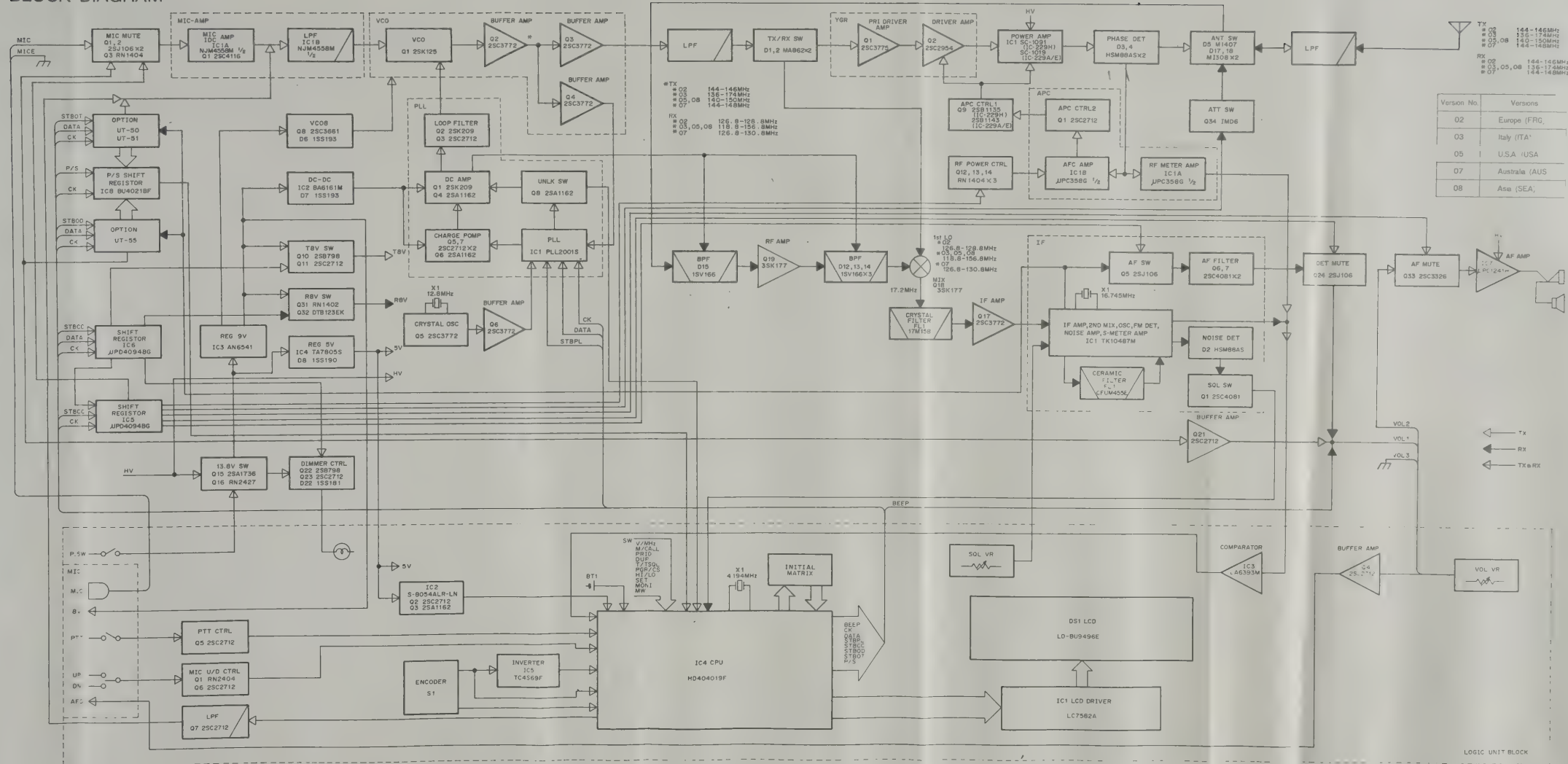
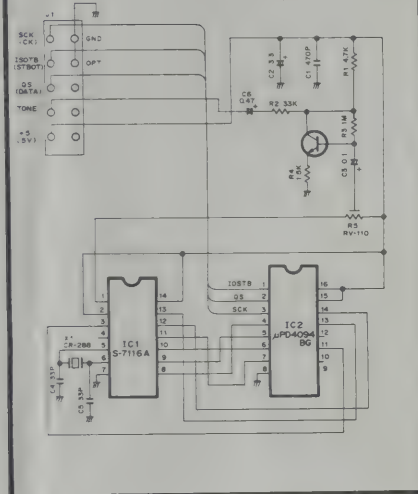
MIC E
SENSOR E
RIT E
RF
BPF
PREMIX
PL

123

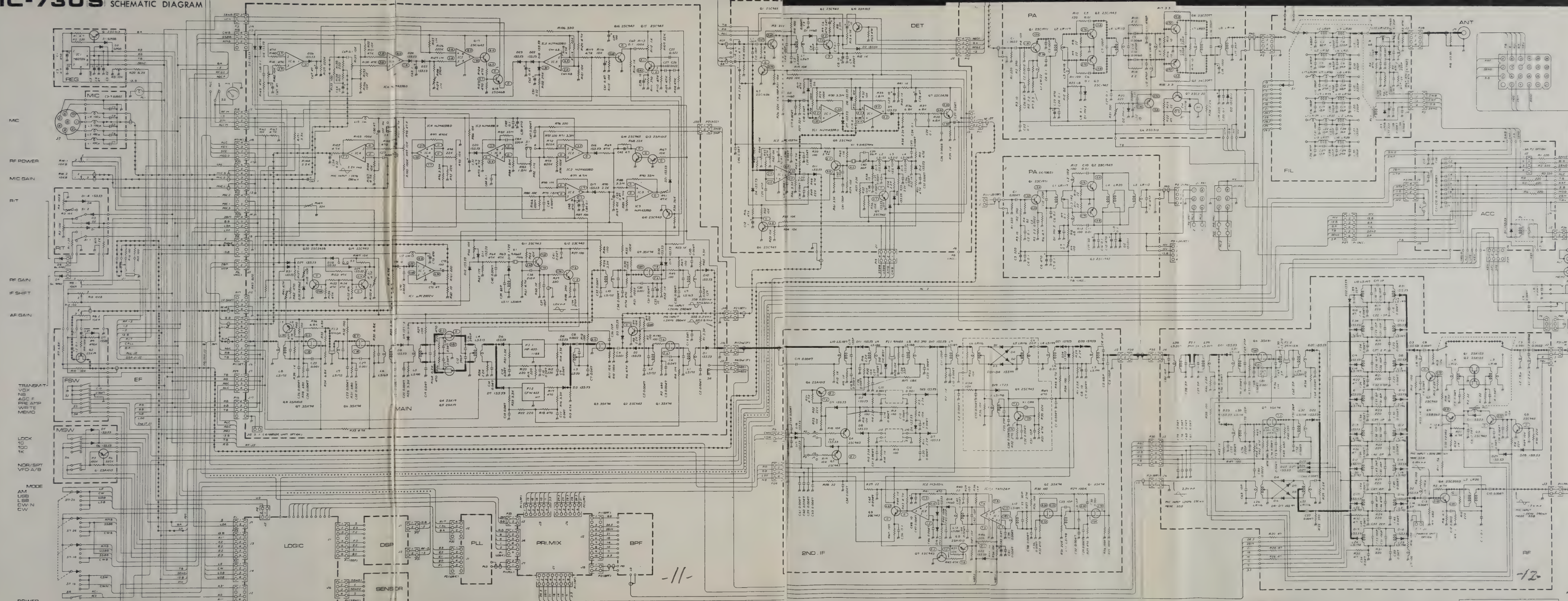


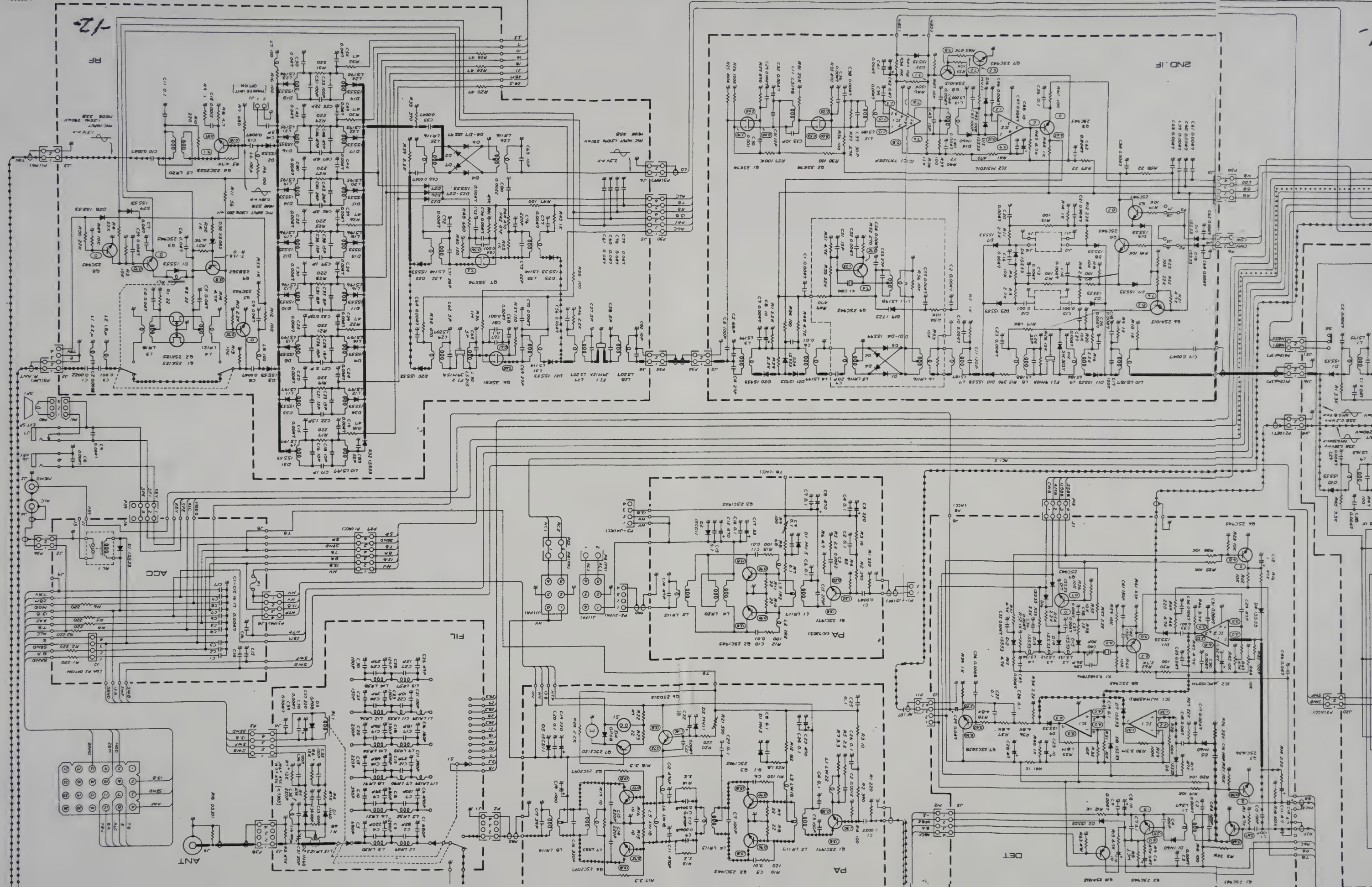
BLOCK DIAGRAM

TONE UNIT (U.S.A. ONLY)



LOGIC UNIT BLOCK





SCHEMATIC DIAGRAM

MIC

RF-POWER

MIC-GAIN

RIT

RF-GAIN

IF-SHIFT

AF-GAIN

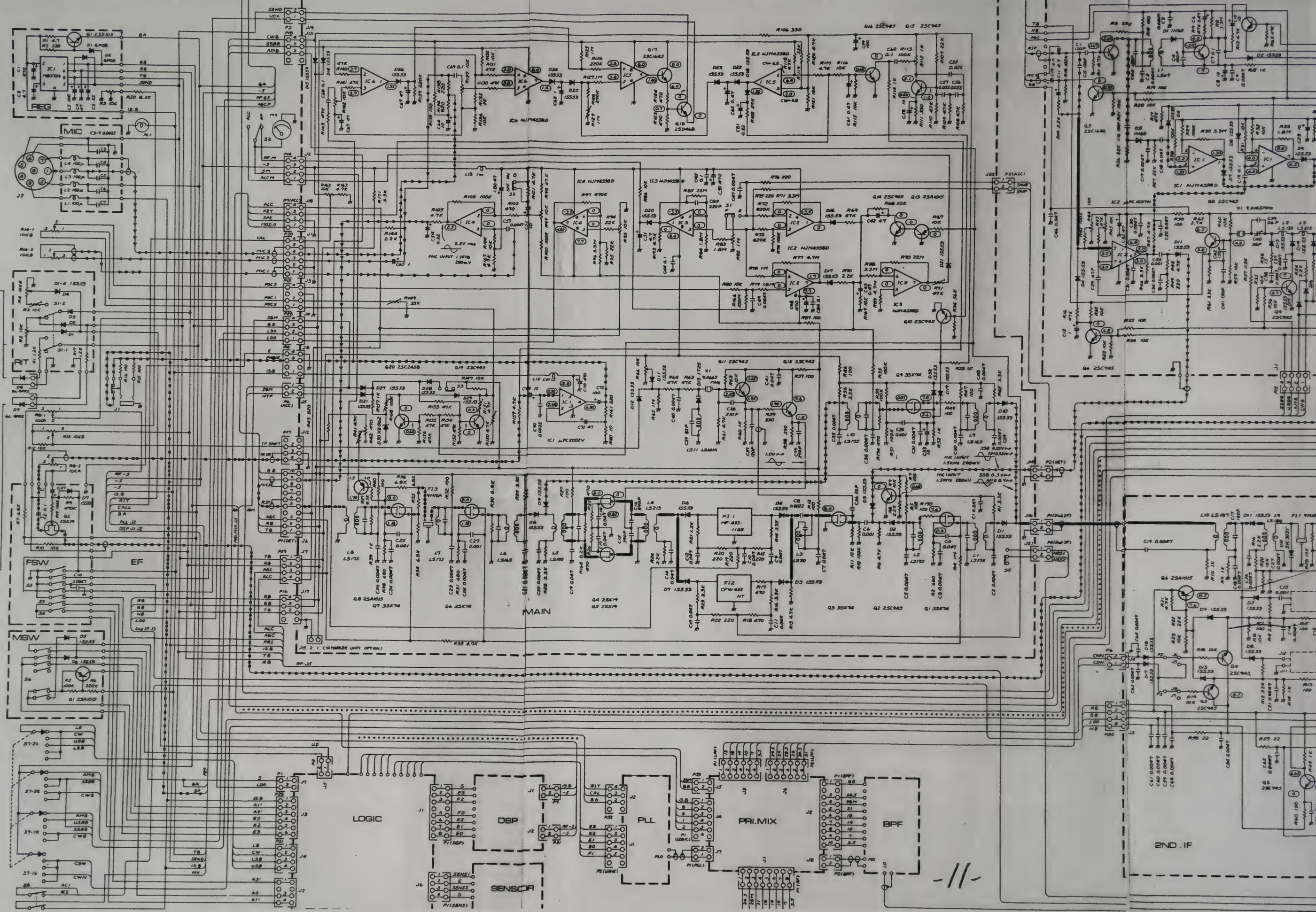
TRANSMIT
VOX
NB
AGC-F
PRE-AMP
WRITE
MEMO

LOCK
10
100
1K

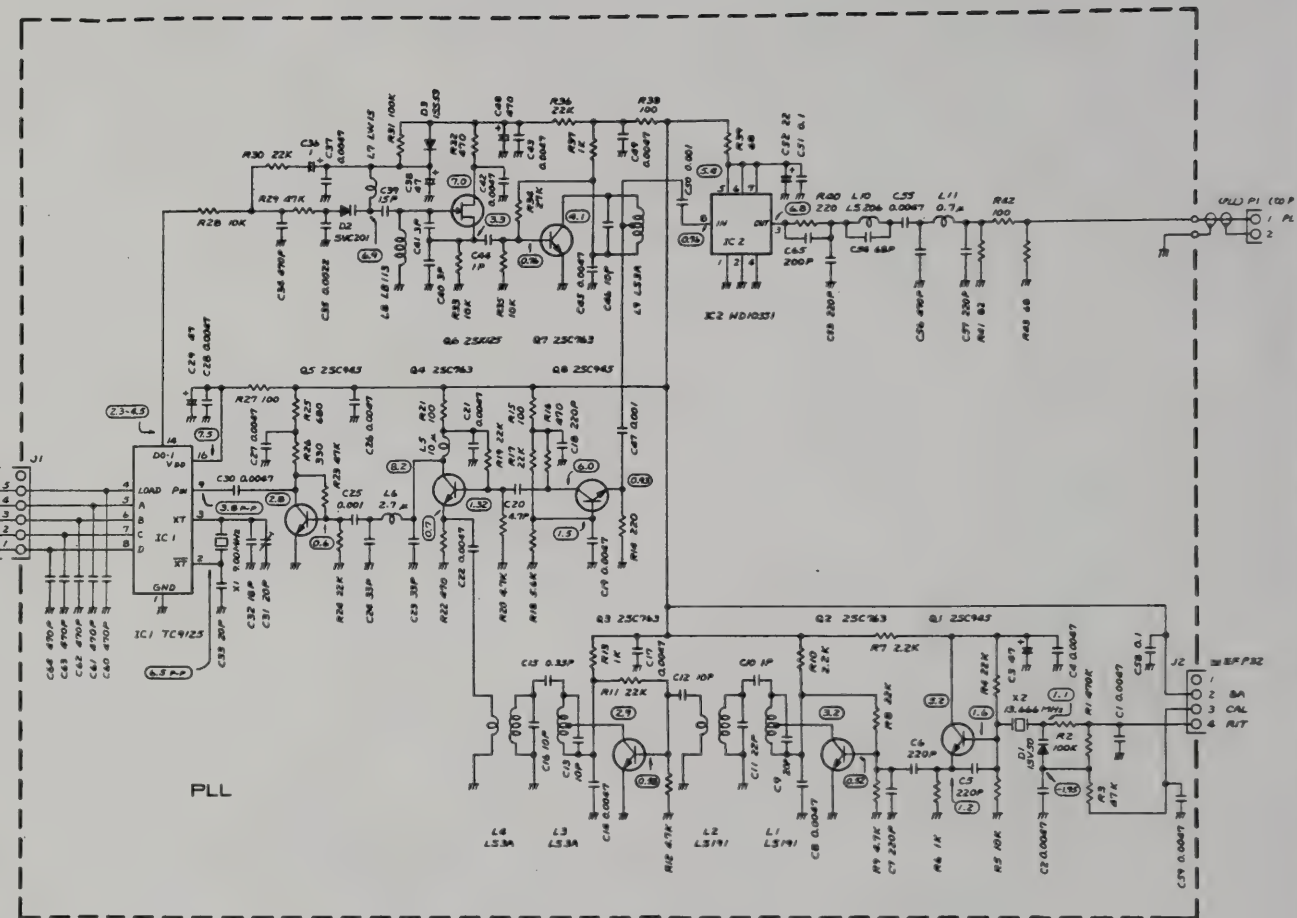
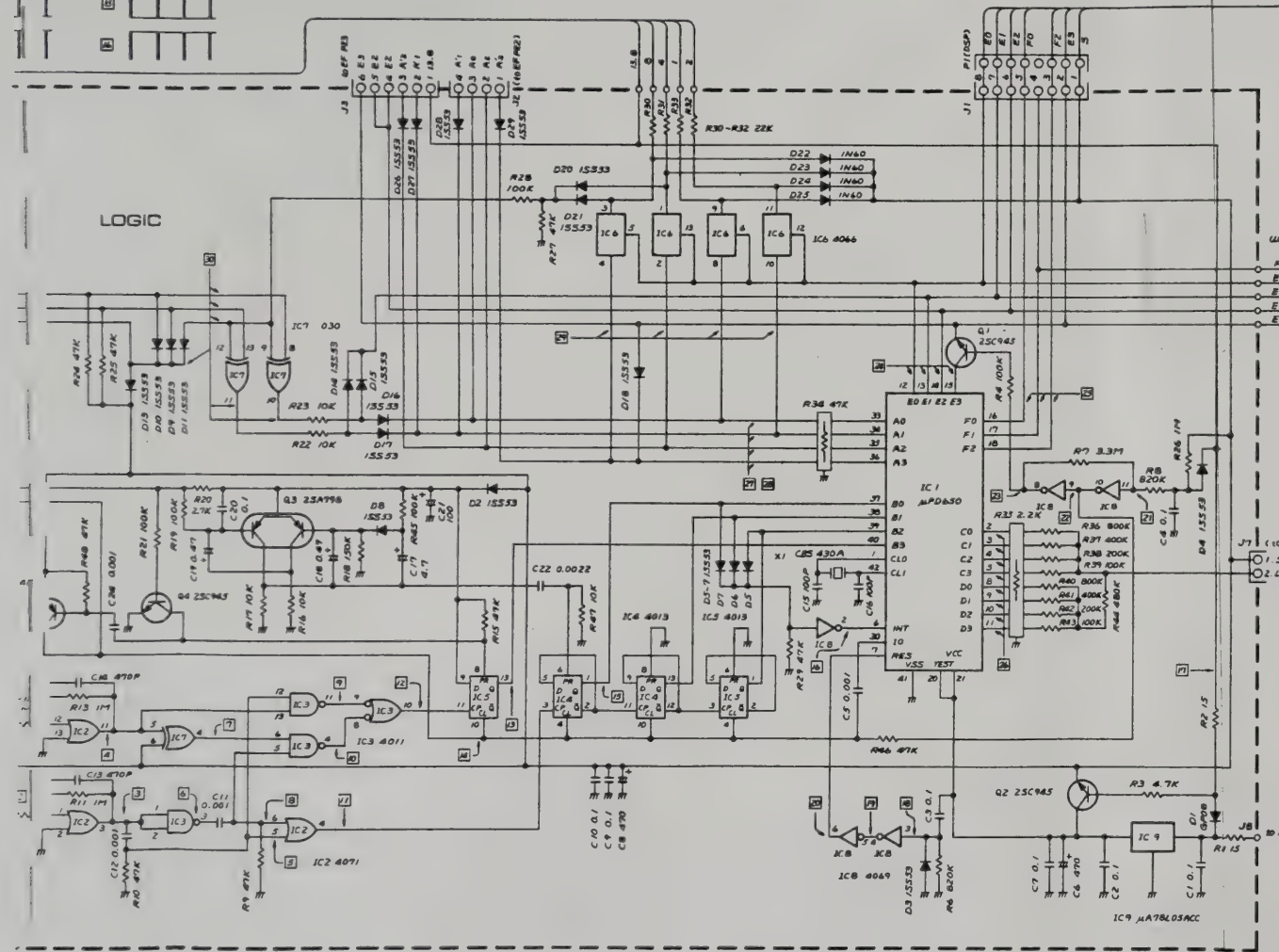
NOR/SPT
VFO A/B

MODE
AM
USB
LSB
CW-N
CW

POWER



-11-



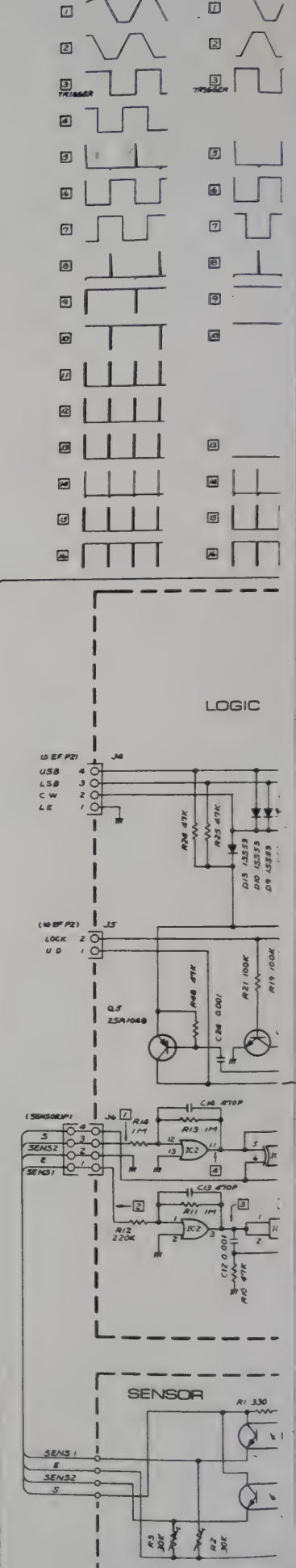
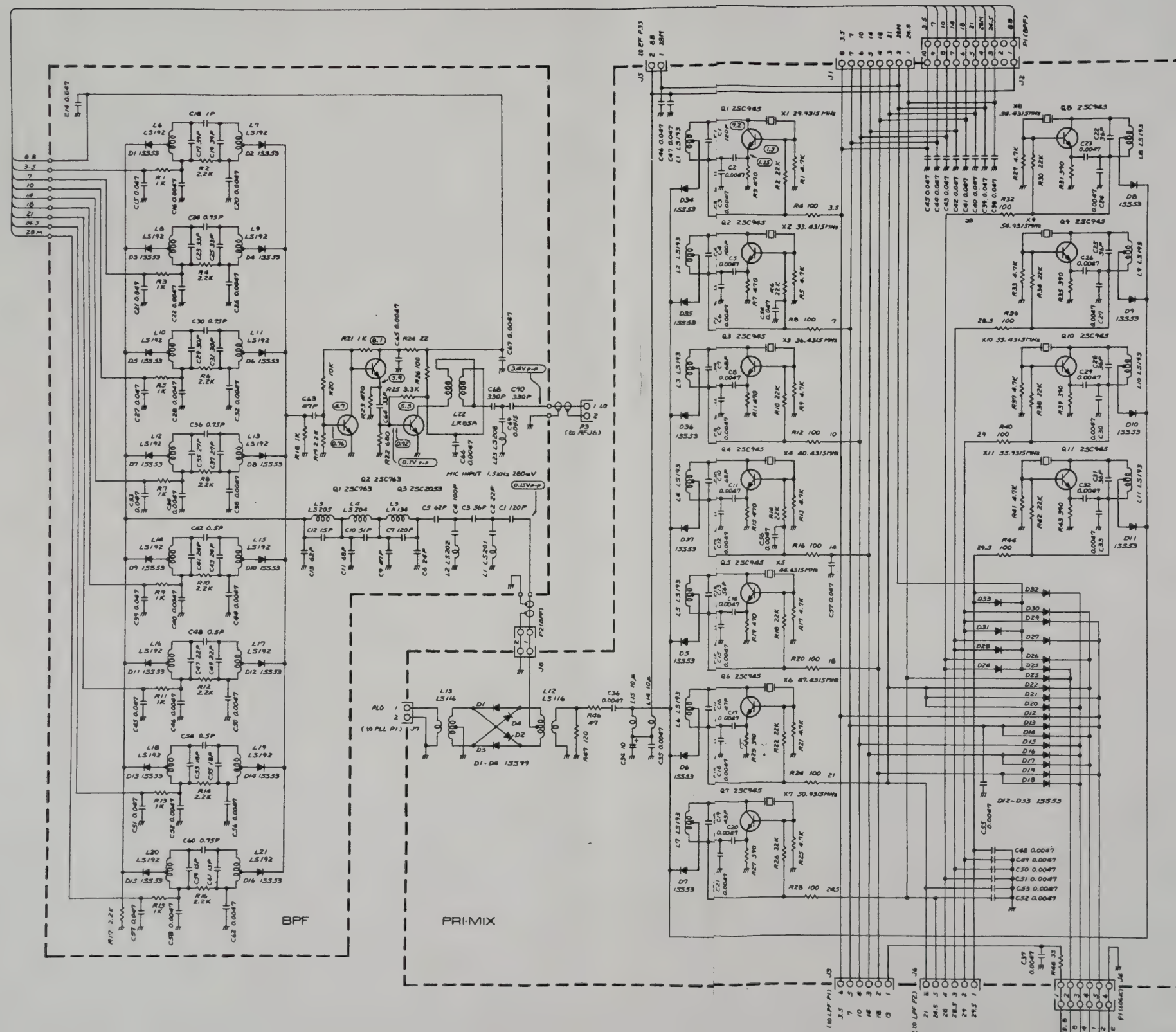
MODE SW

BAND	MODE	J-2	J-8	J-6	J-4	IC7-9	IC7-12	IC7-10	IC7-11
3.5 MHz	CW	L	L	L	L	L	L	L	L
-7 MHz	USB	M	L	M	L	L	L	M	L
	USB	M	L	L	L	M	M	M	M
10 MHz	CW	L	M	L	L	L	L	L	L
-2.8 MHz	USB	M	M	M	M	M	M	M	M
	USB	M	M	L	L	M	M	M	L

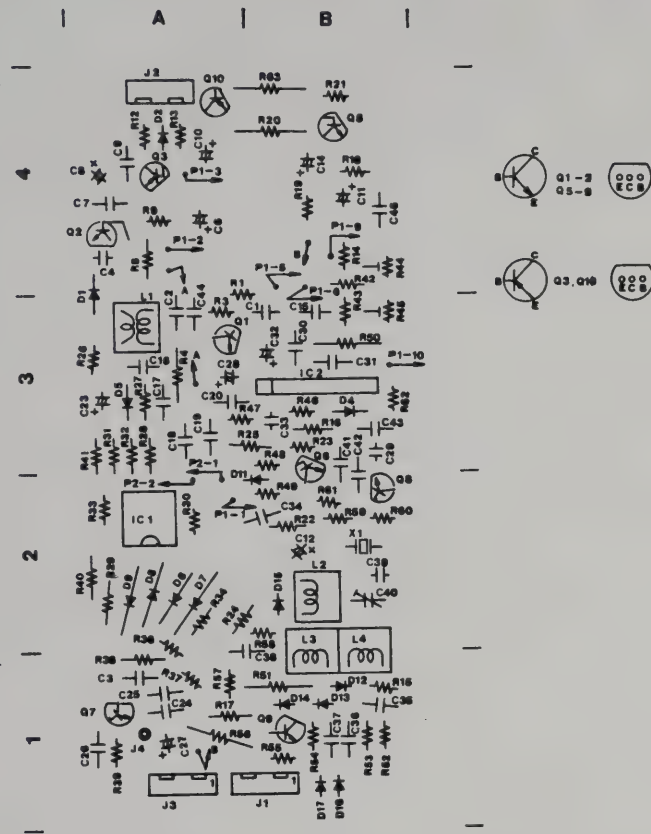
MODE SW

BAND	IC-6 9-8	IC-6 11-10	IC-6 1-2	IC-6 3-6
3.5 MHz	L	M	L	L
7	M	M	L	L
10	L	L	M	L
14	M	L	M	L
18	L	M	M	L
21	M	M	M	L
24.5	L	L	L	M
28	M	L	L	M
28.3	L	M	L	M
29	M	L	M	M
29.3	L	L	M	M
NC	L	L	L	M

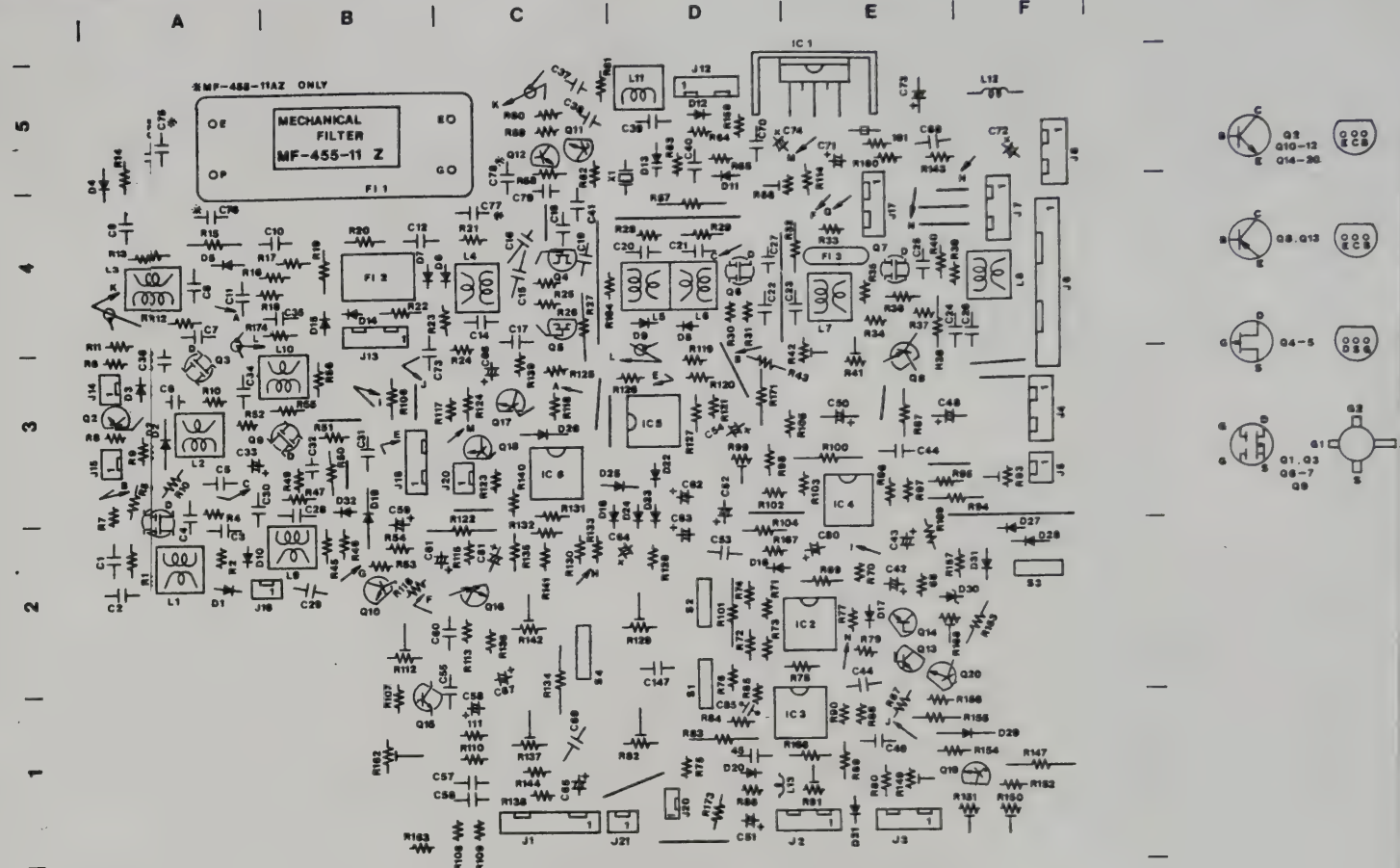
IC-1-12 (10) THROUGH



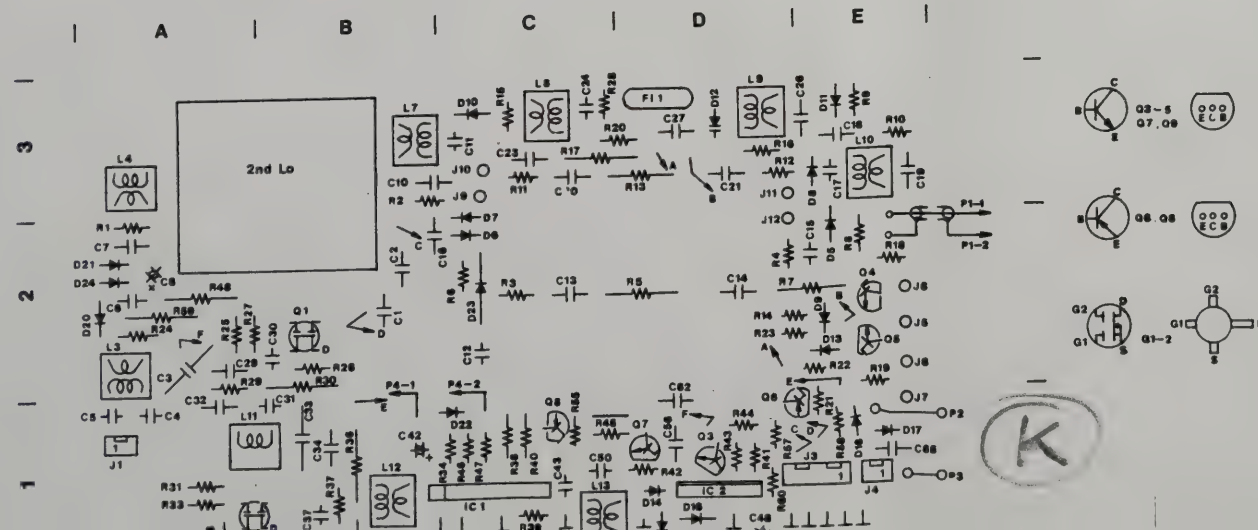
DETECTOR UNIT



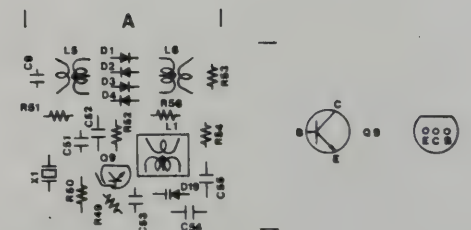
MAIN UNIT

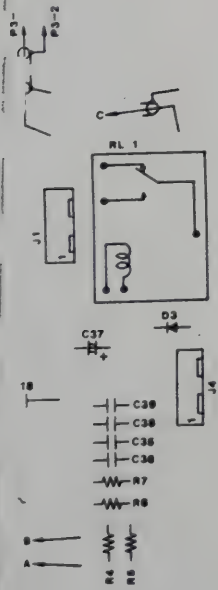


2ND IF UNIT

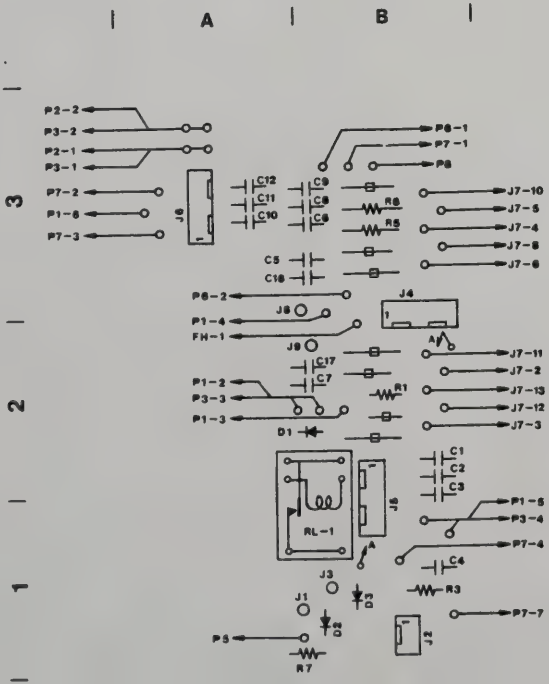


2ND LO UNIT

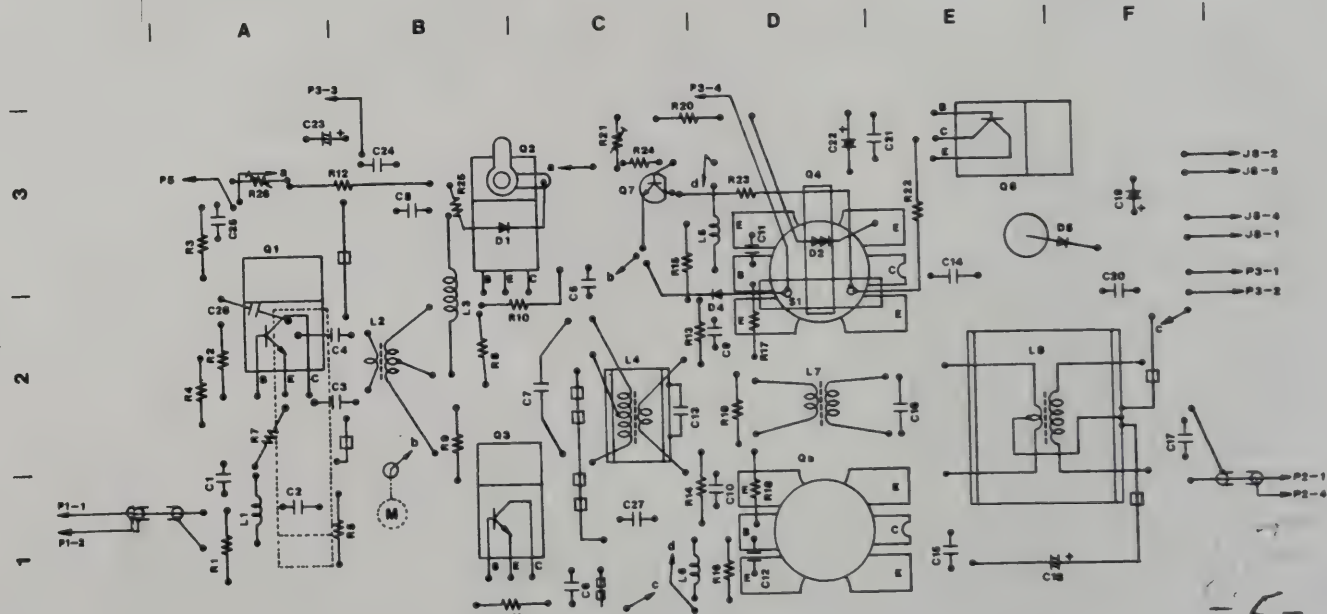




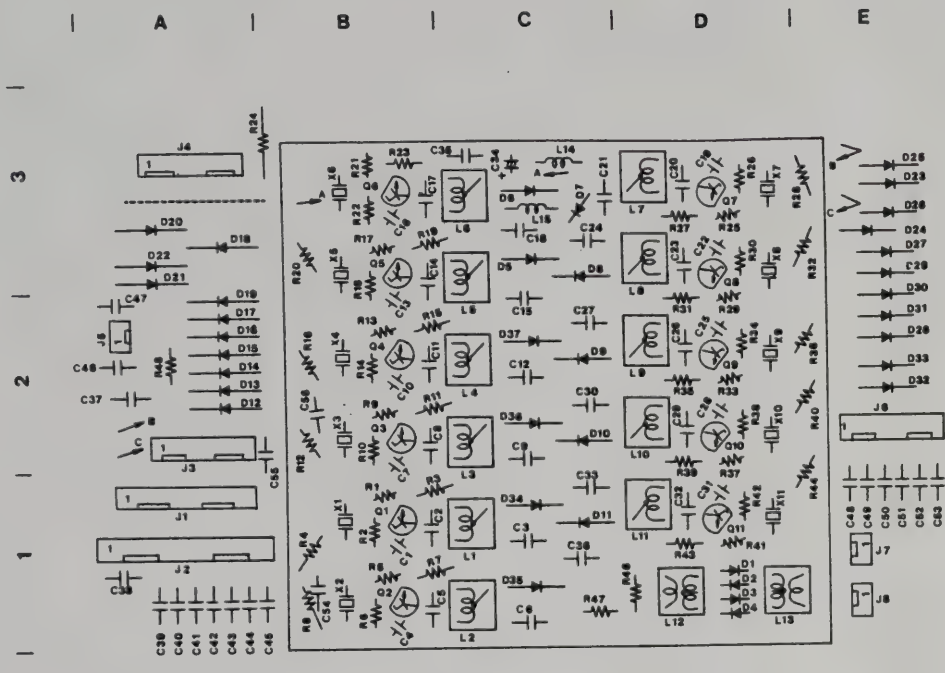
AGC UNIT



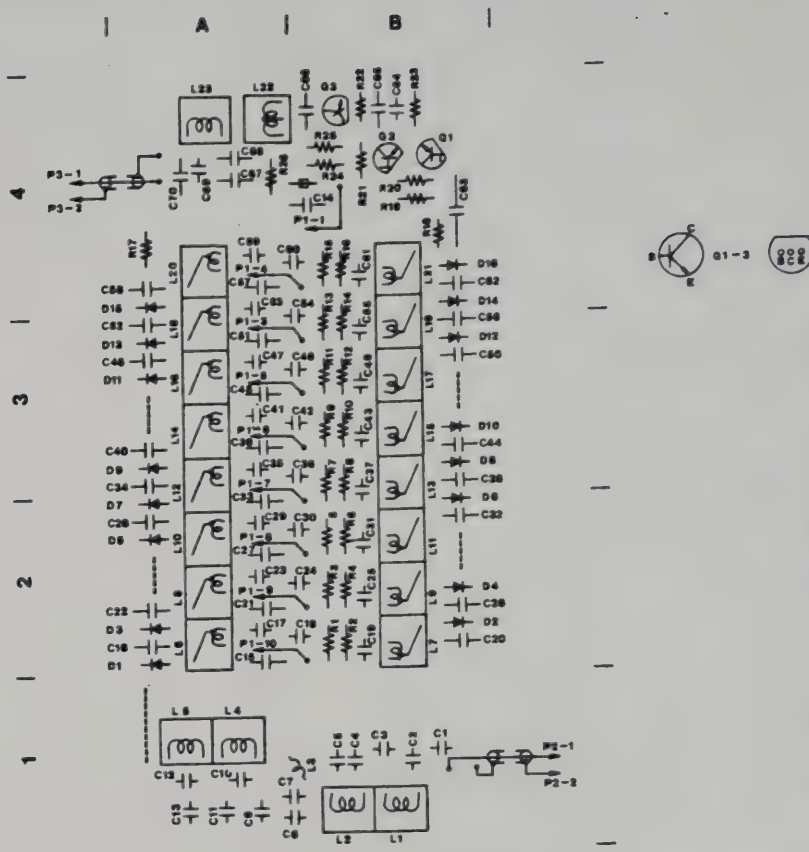
PA UNIT



PREMIX UNIT

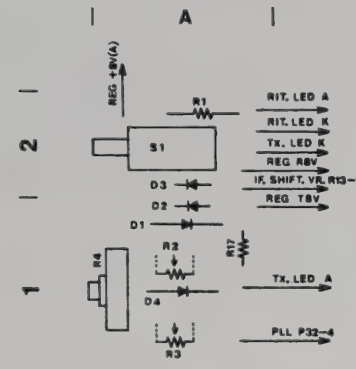


LPF UNIT

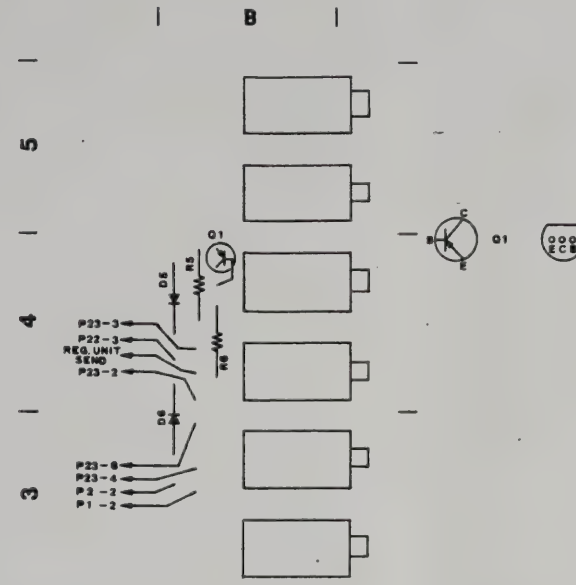


RF UNIT

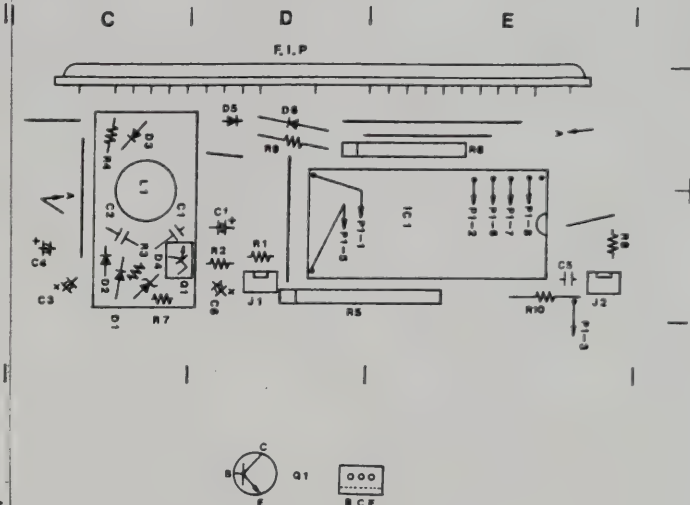
RIT BOARD



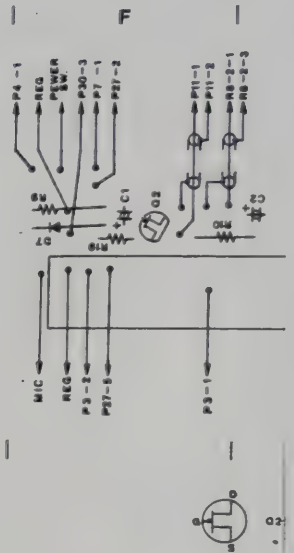
M SW BOARD



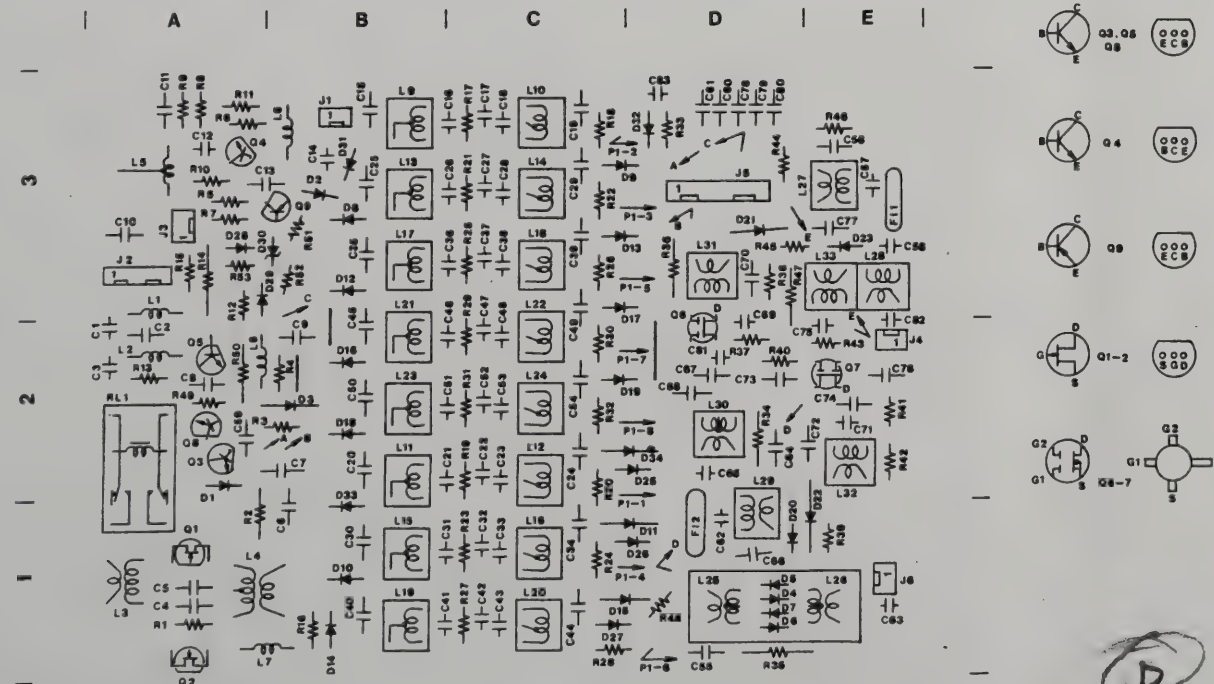
DISPLAY BOARD



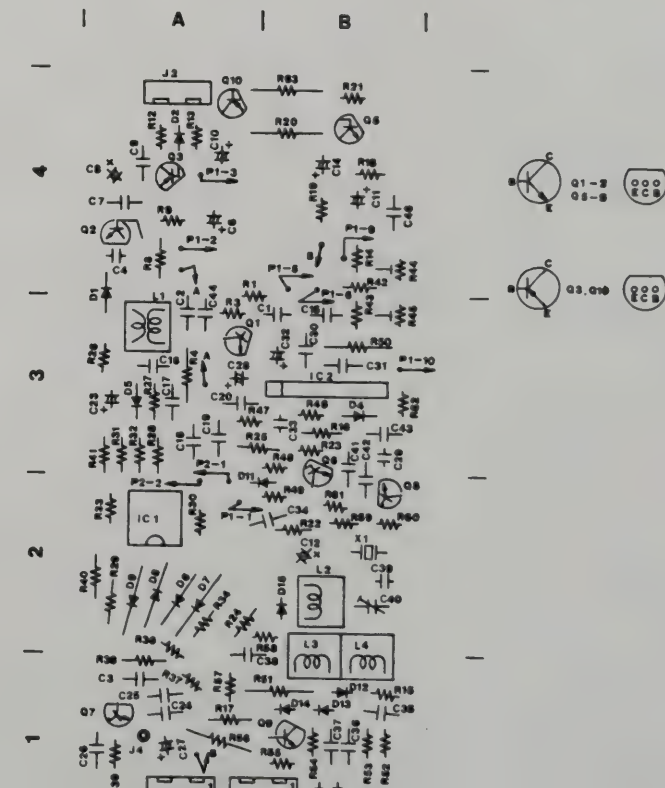
F SW BOARD



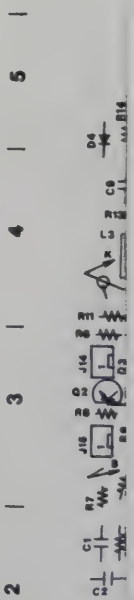
RF UNIT



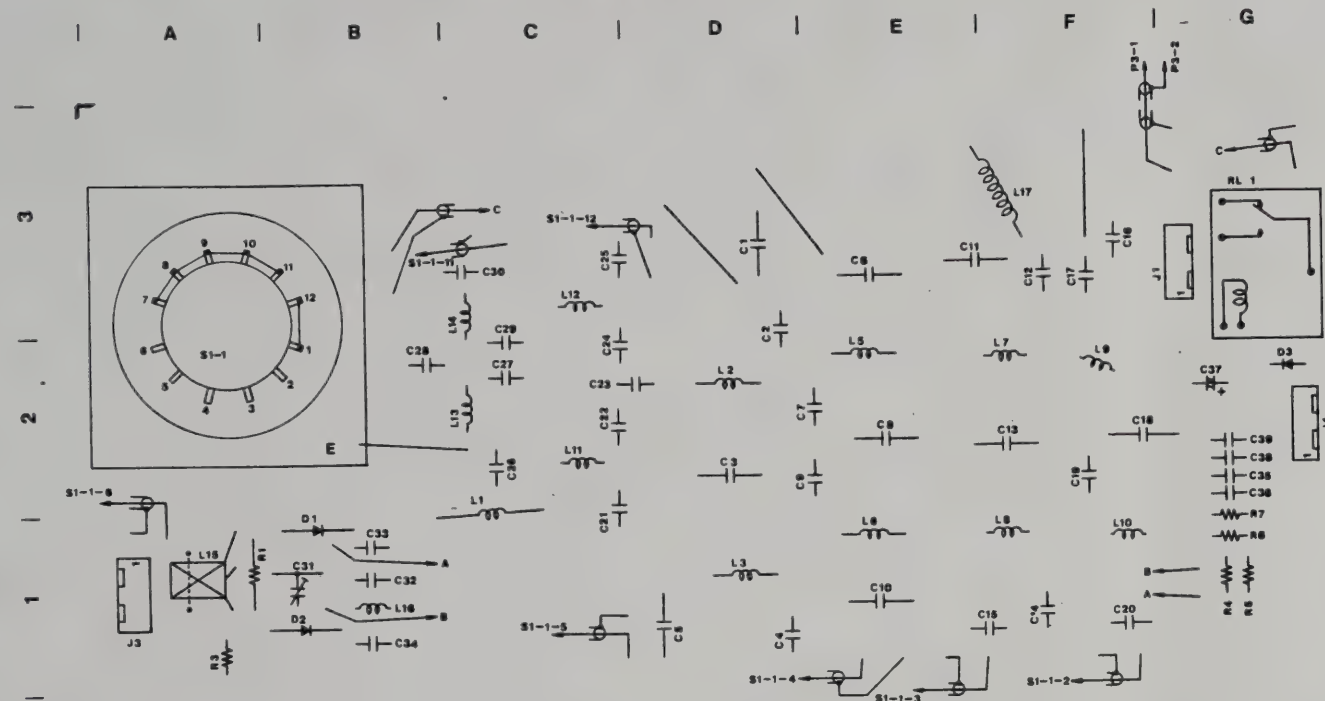
RF UNIT



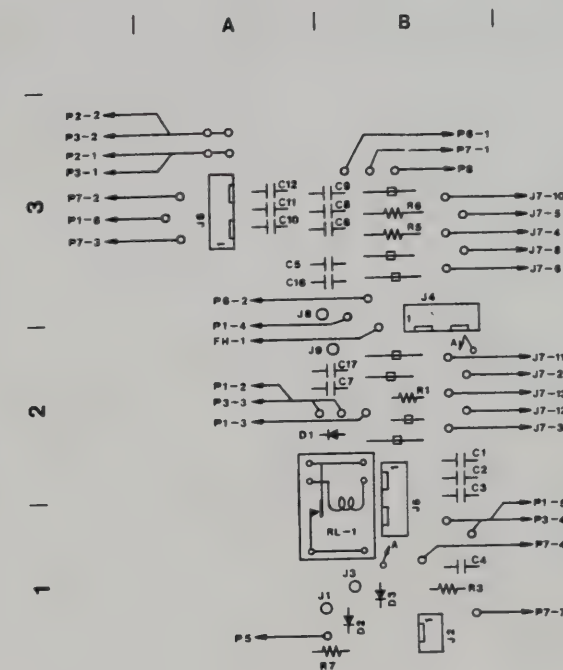
MAIN UNIT



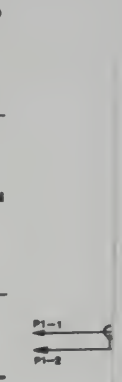
FILTER UNIT



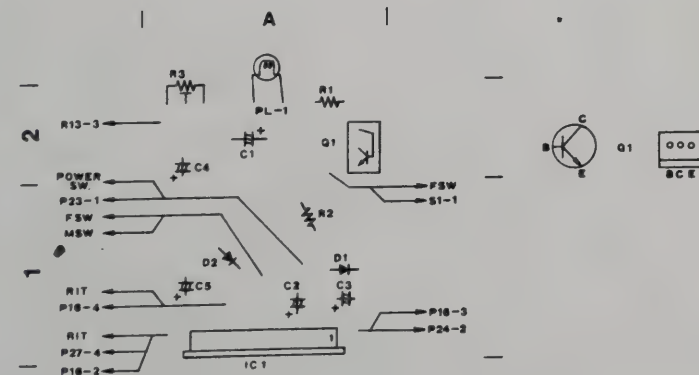
AGC UNIT



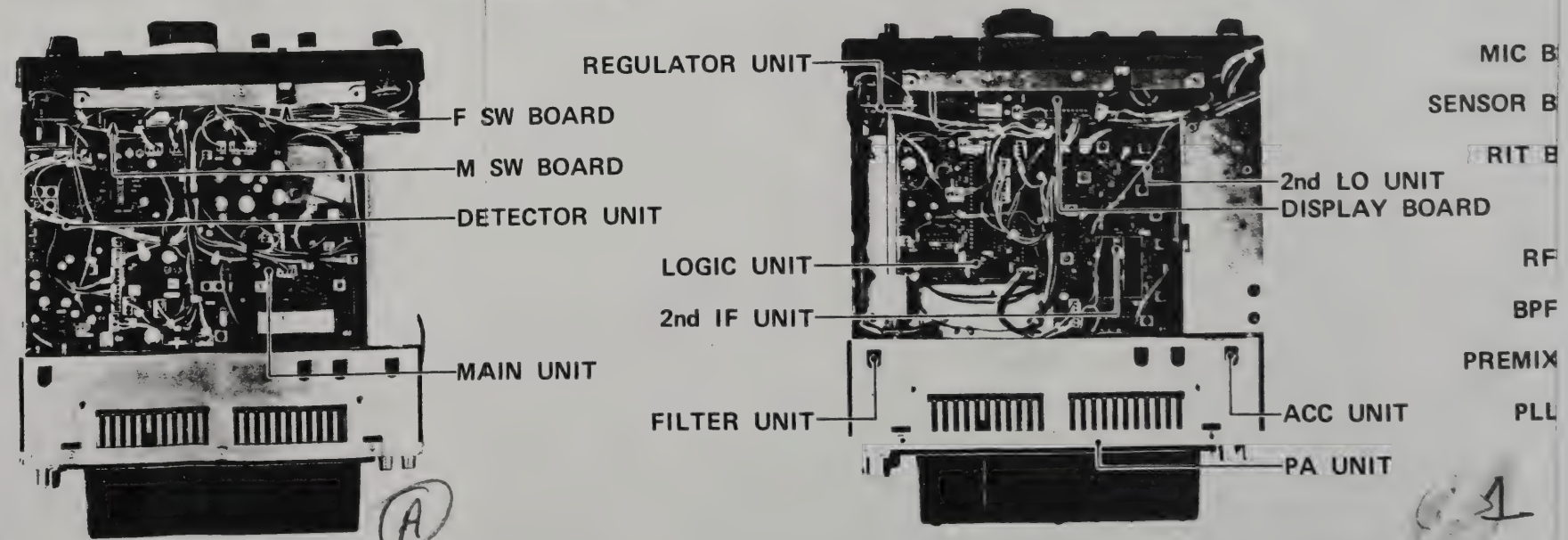
PA UNIT



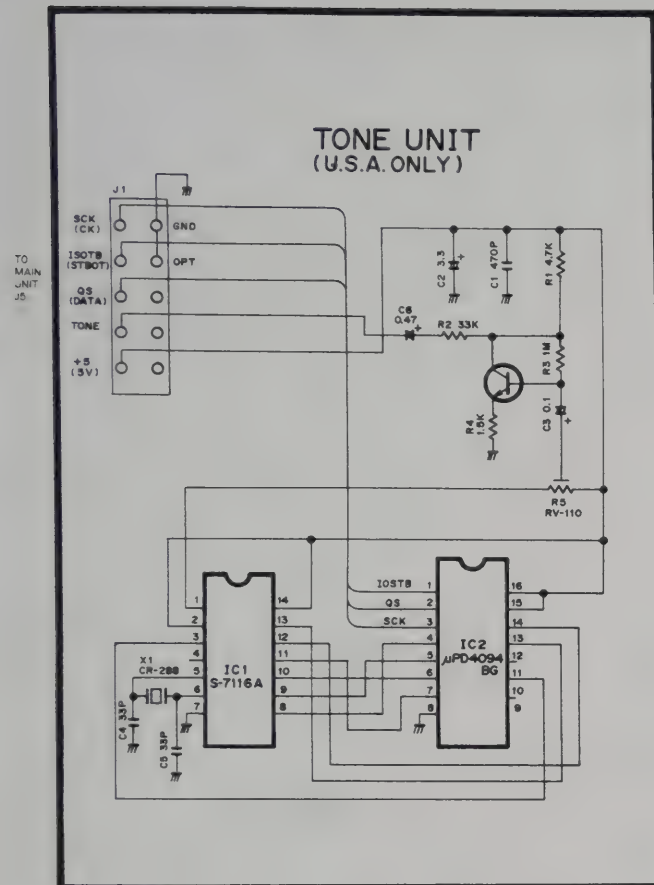
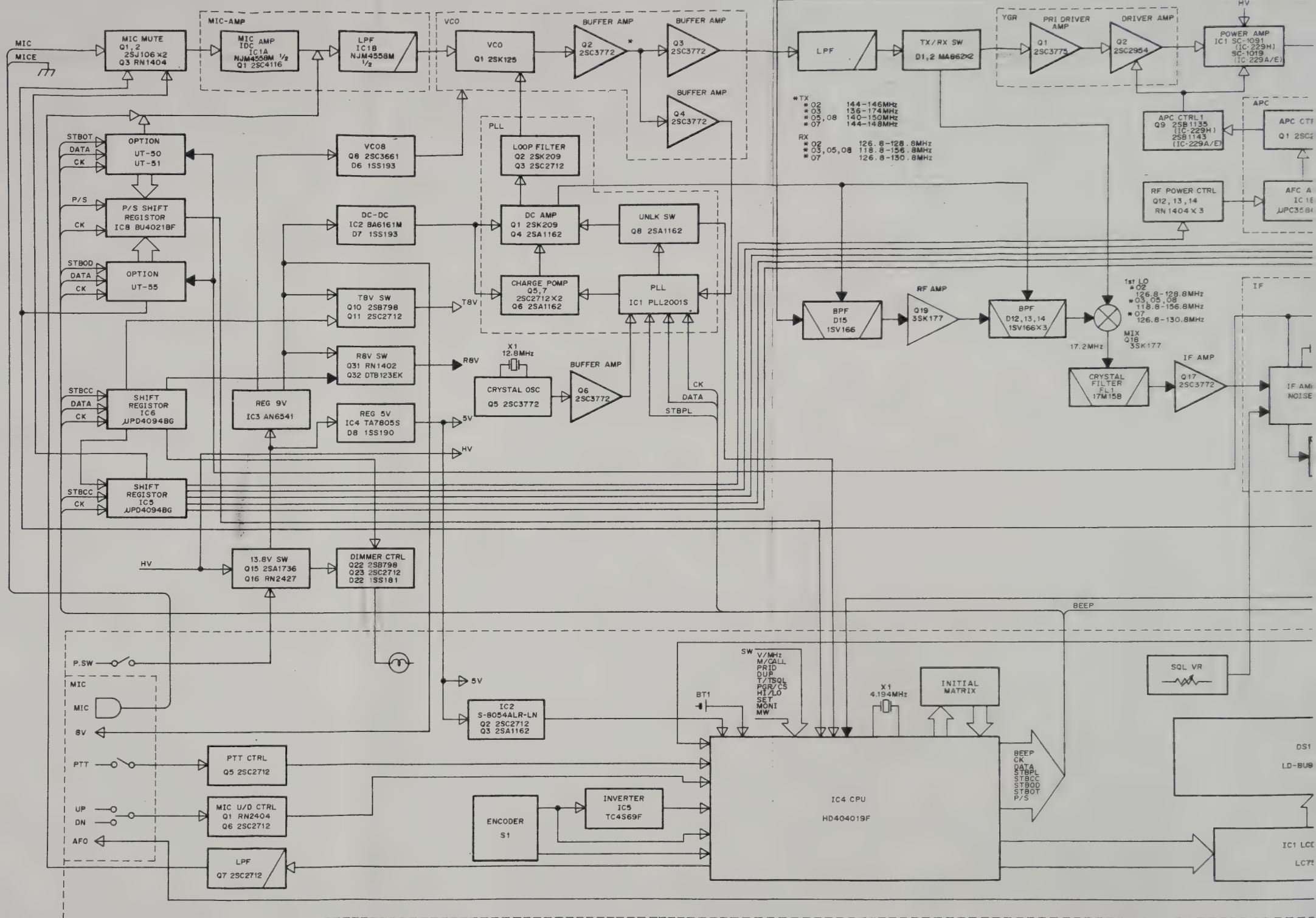
REGULATOR UNIT

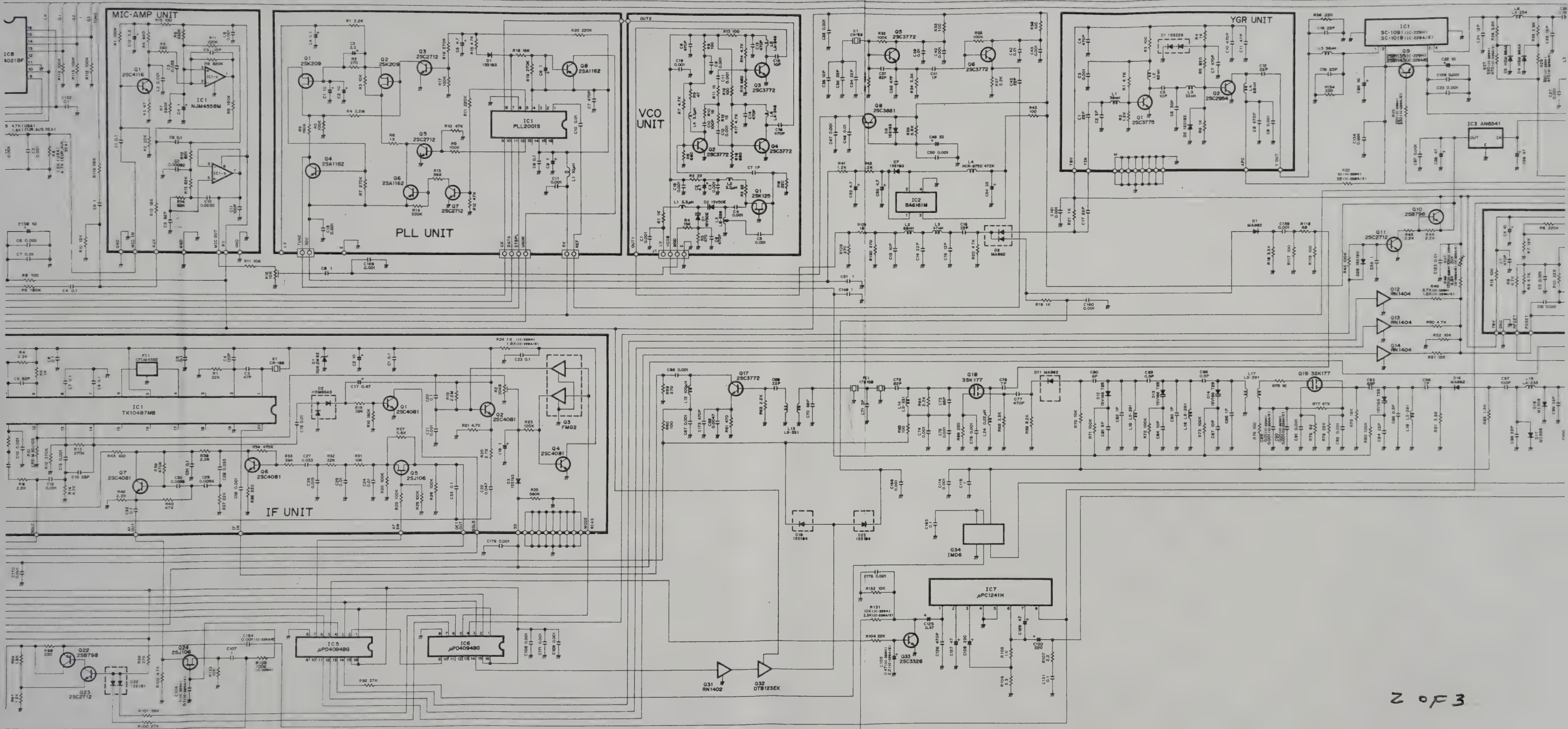


UNIT LAYOUT



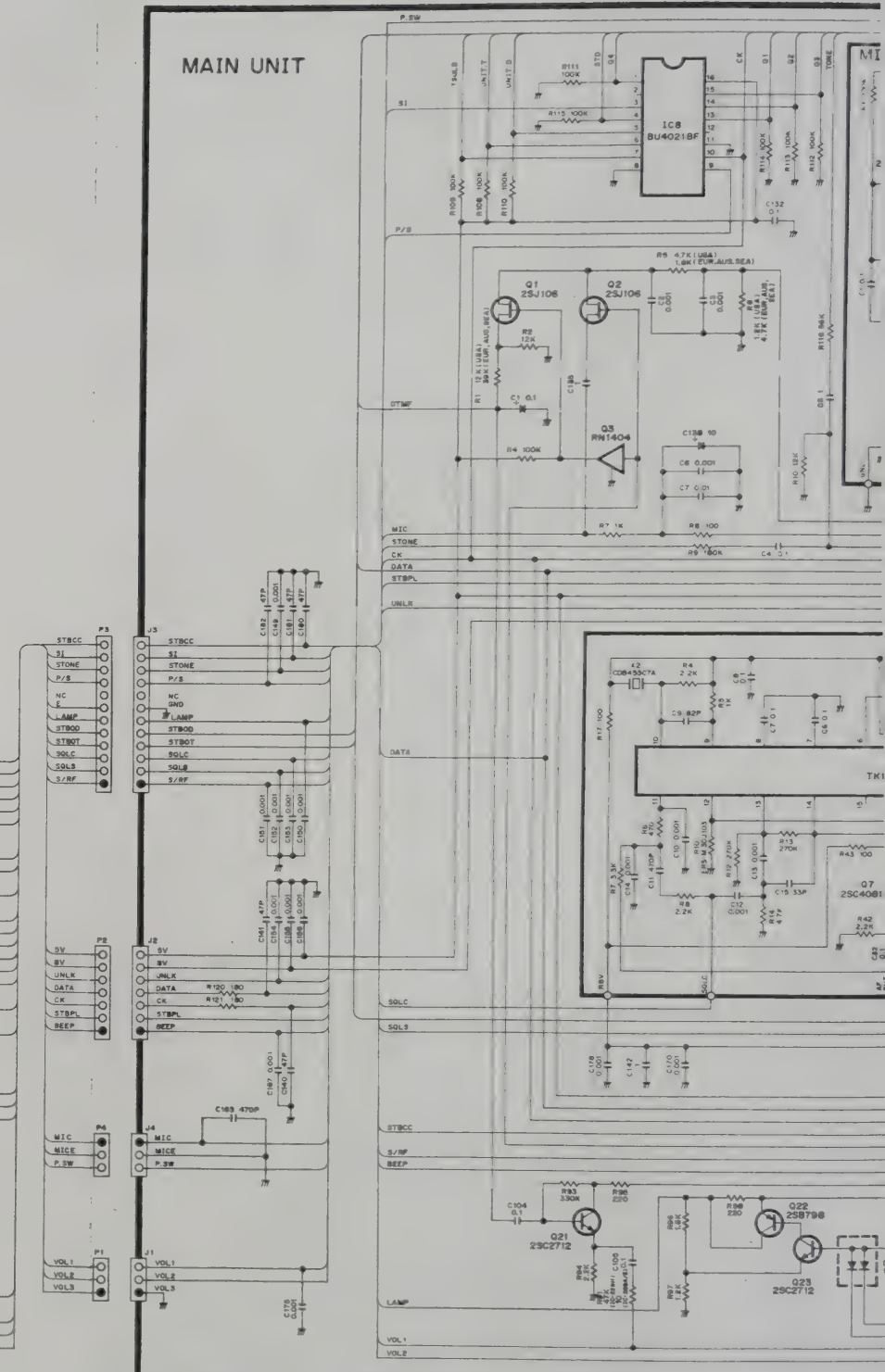
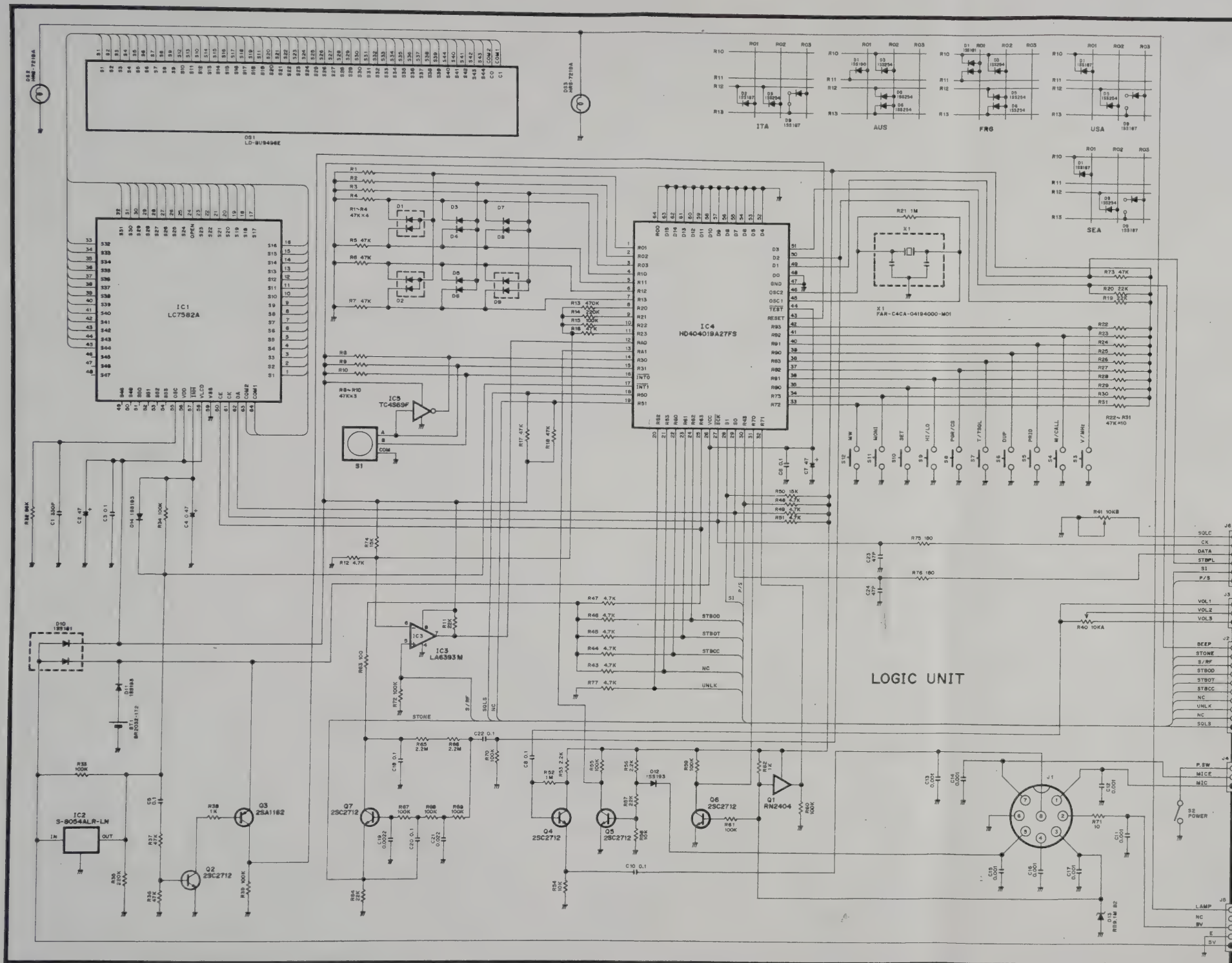
BLOCK DIAGRAM



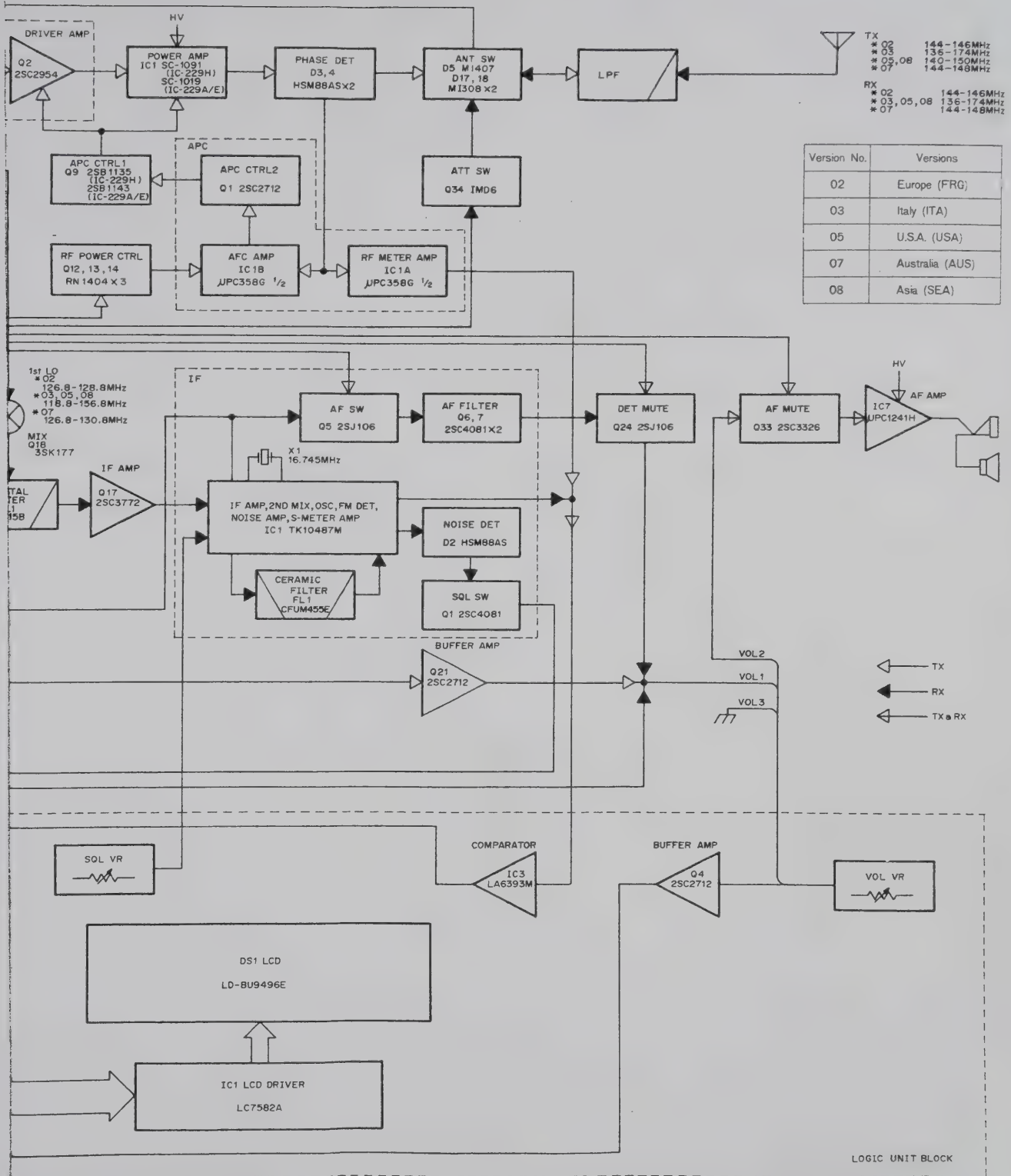


2 of 3

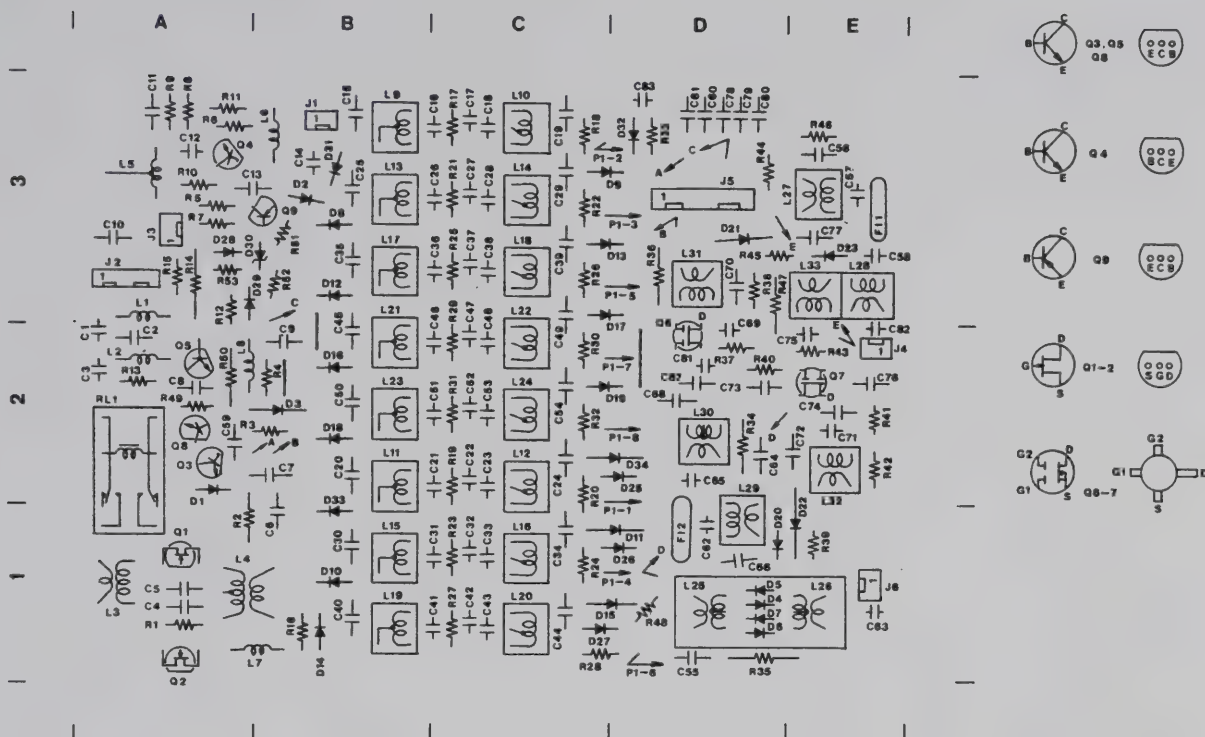
To upgrade quality, some components may be subject to change without notice.



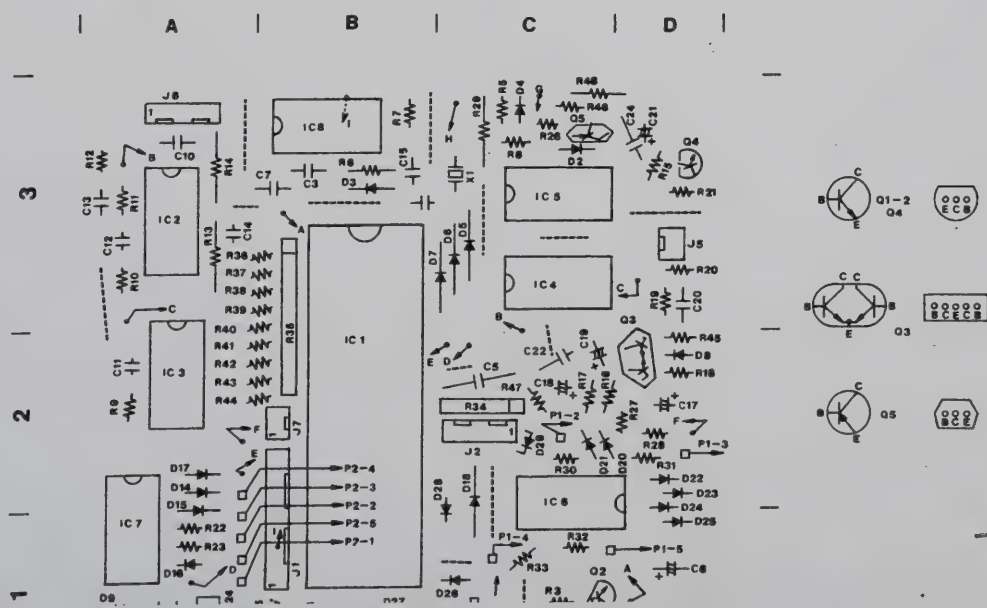
BLOCK DIAG. (CONT)



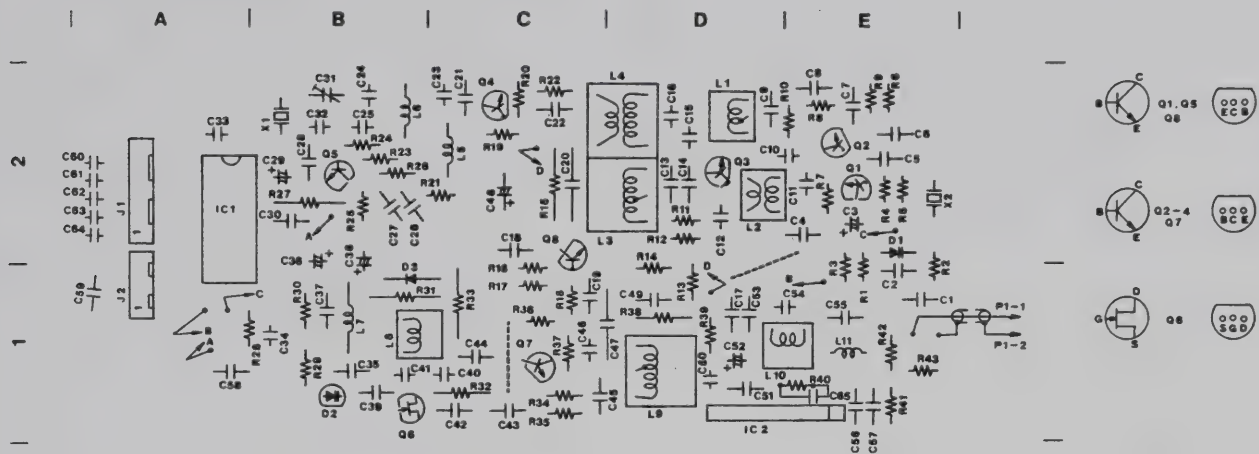
RF UNIT



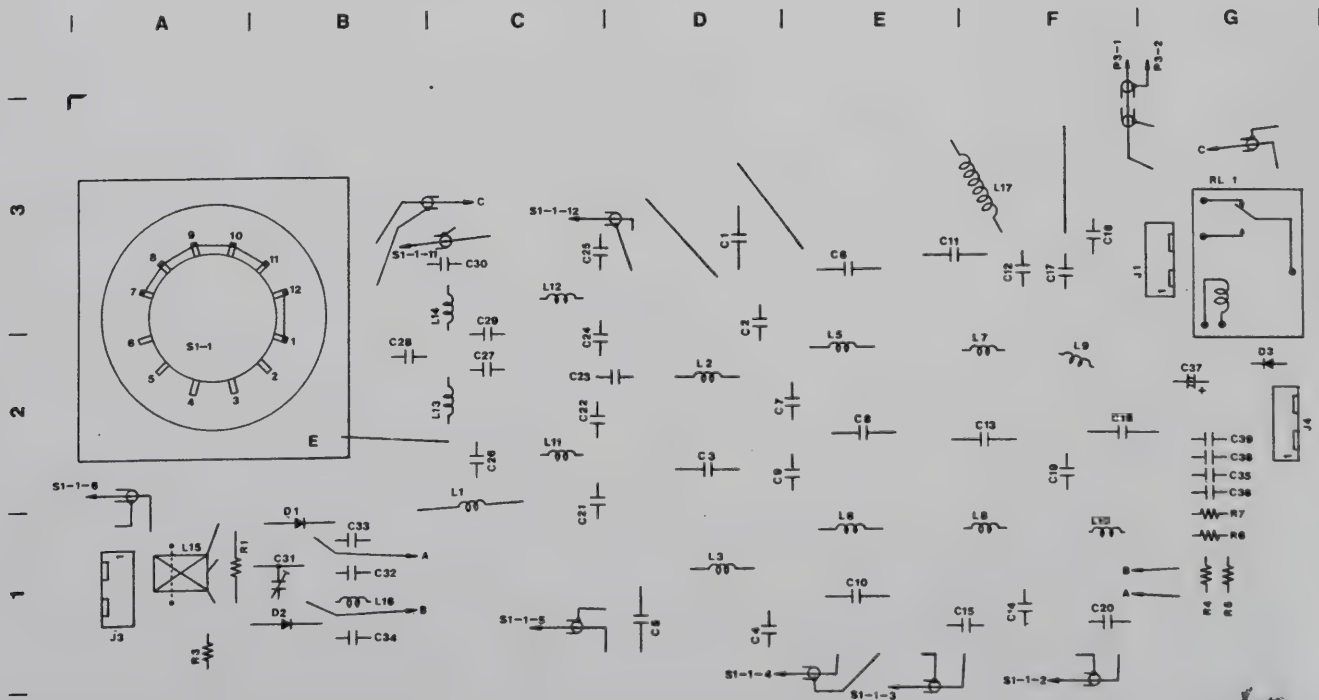
LOGIC UNIT

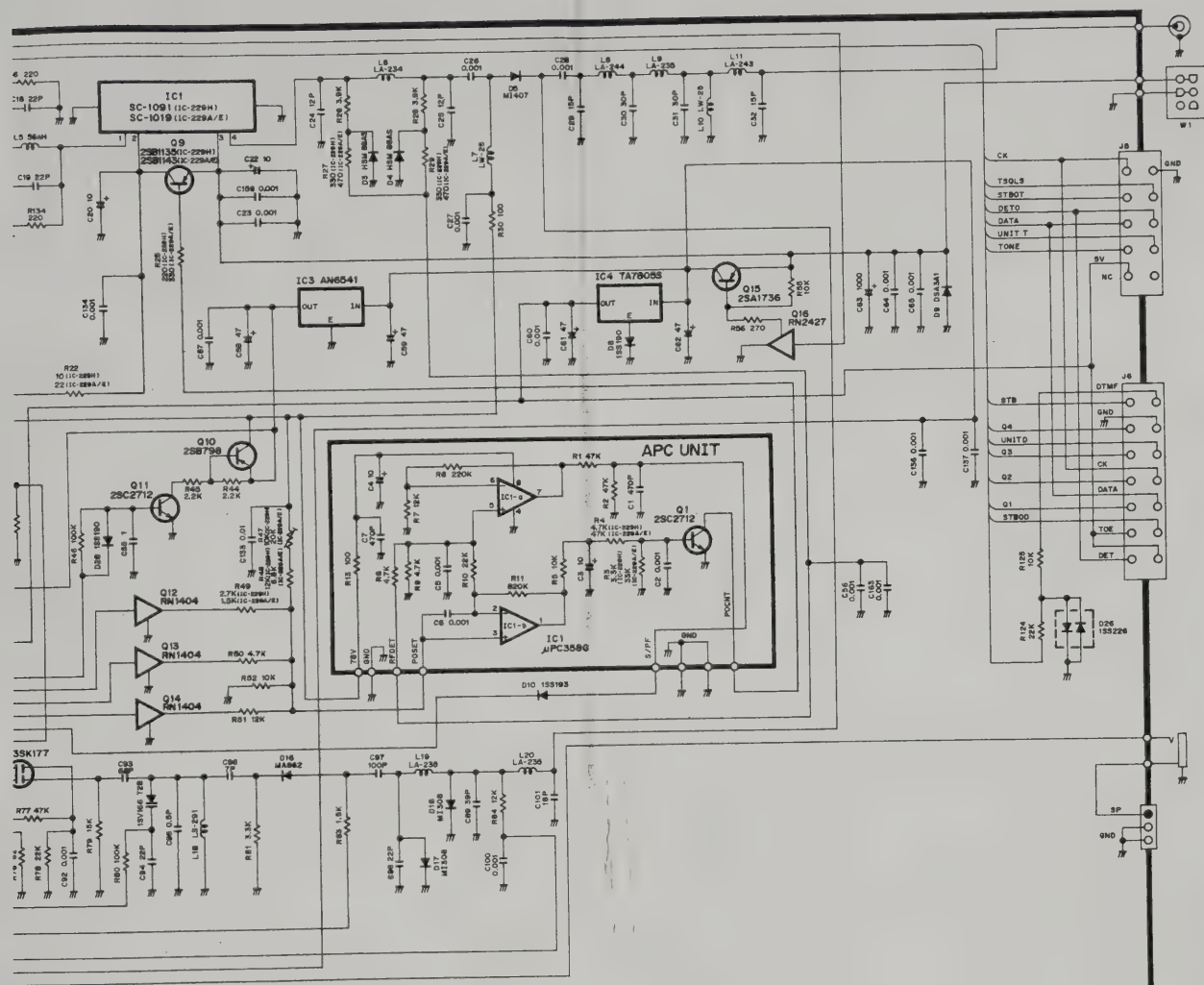


PLL UNIT



FILTER UNIT





3 OF 3

To upgrade quality, some components may be subject to change without notice.

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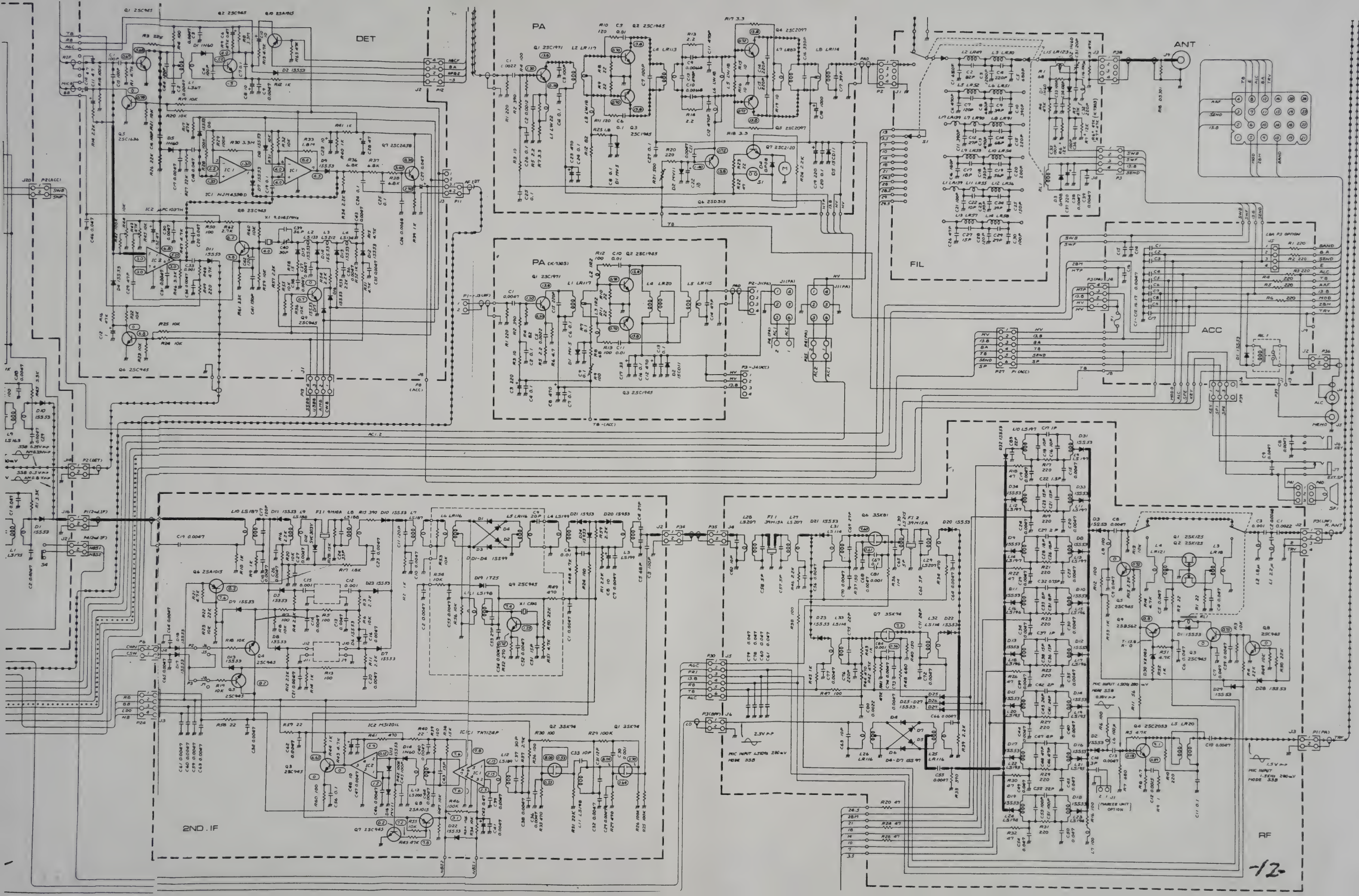
3
2
1



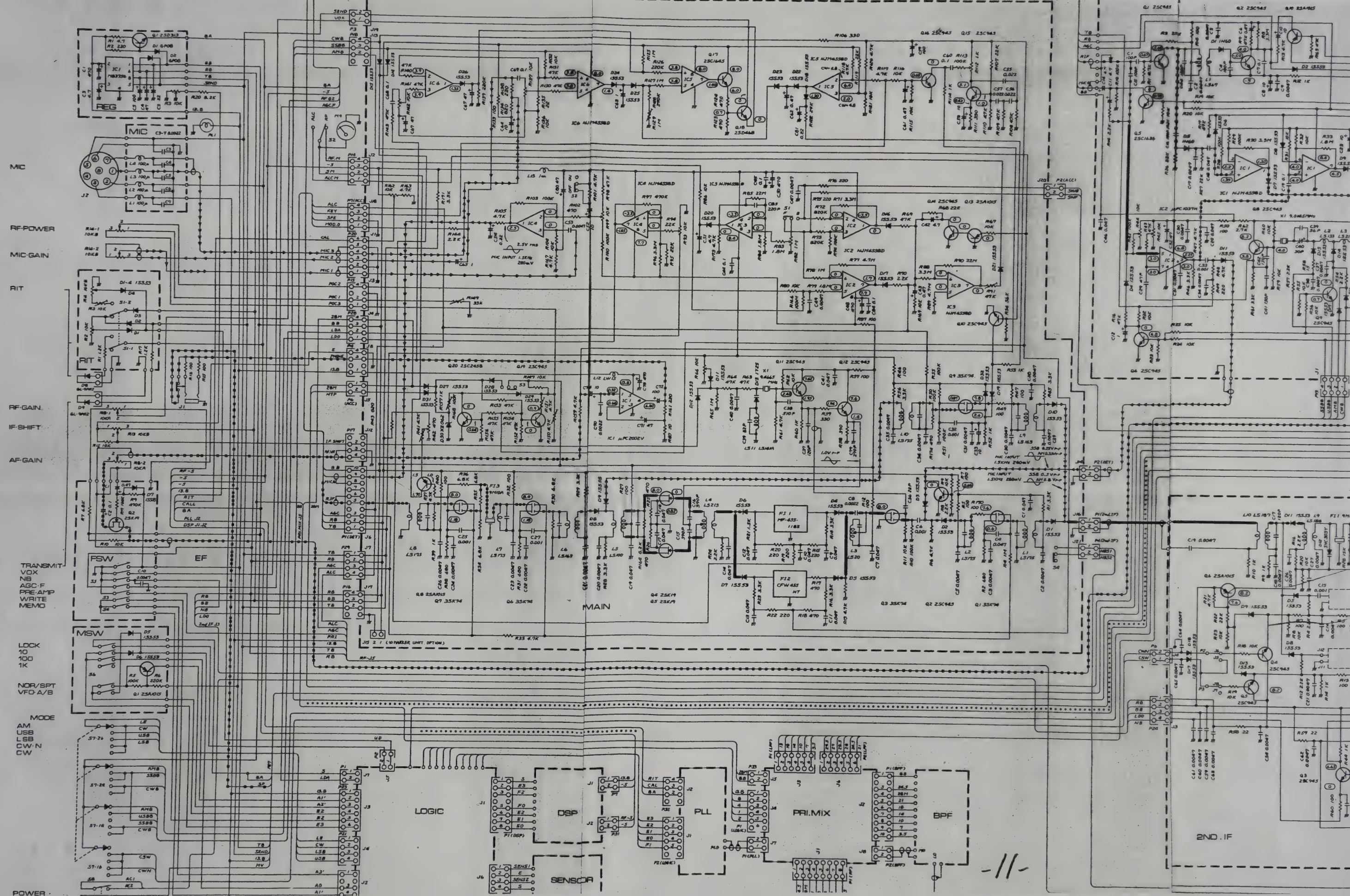
ICOM INCORPORATED

Print

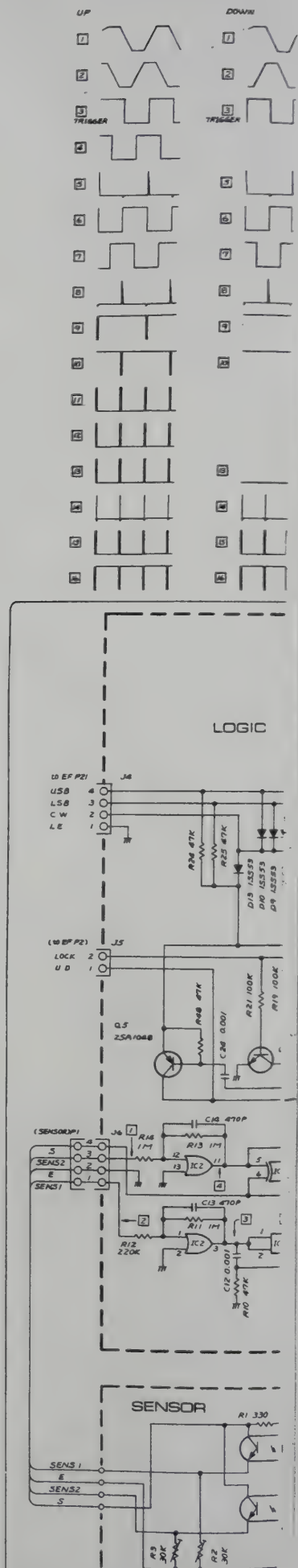
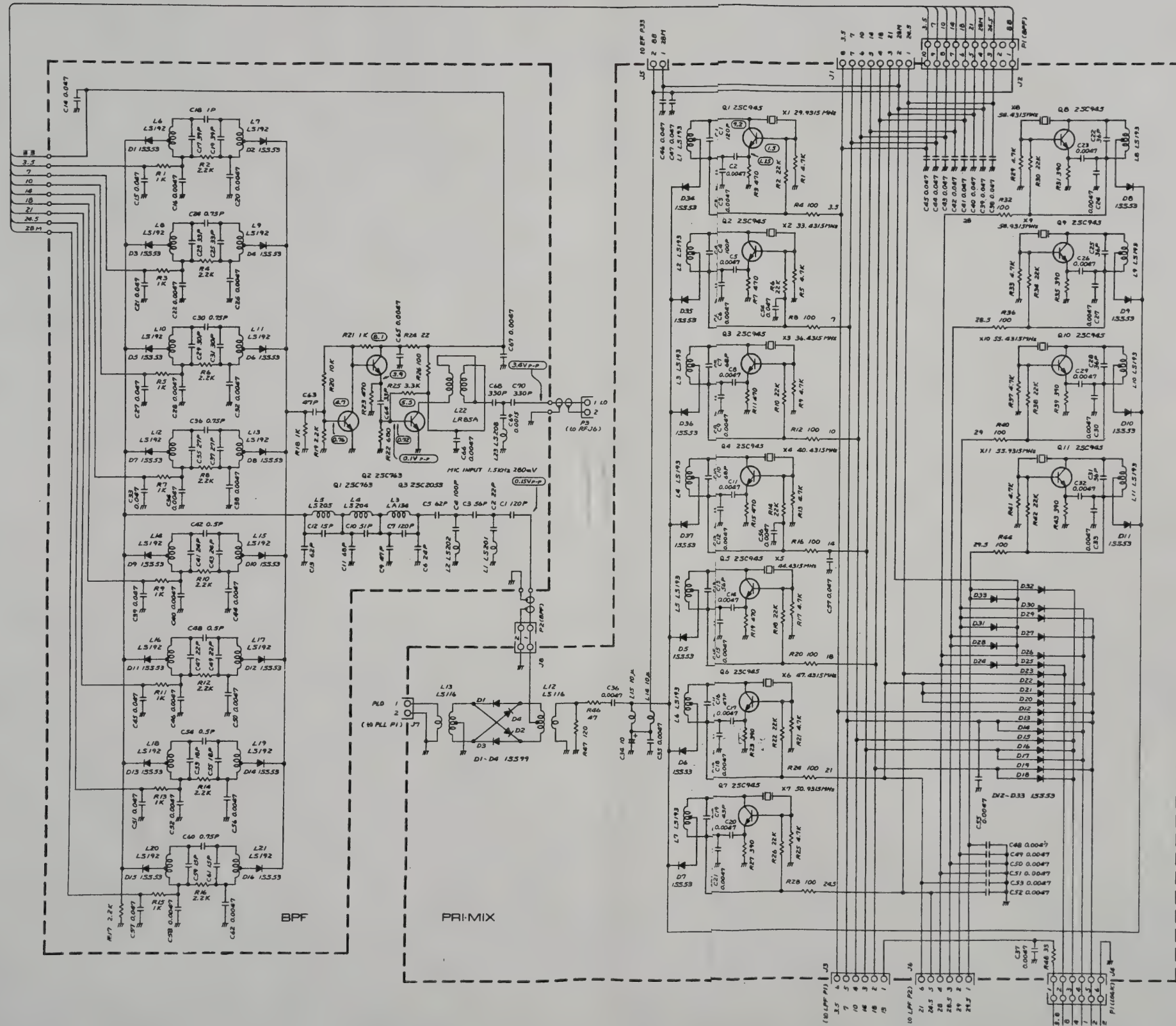
→ 2 ←



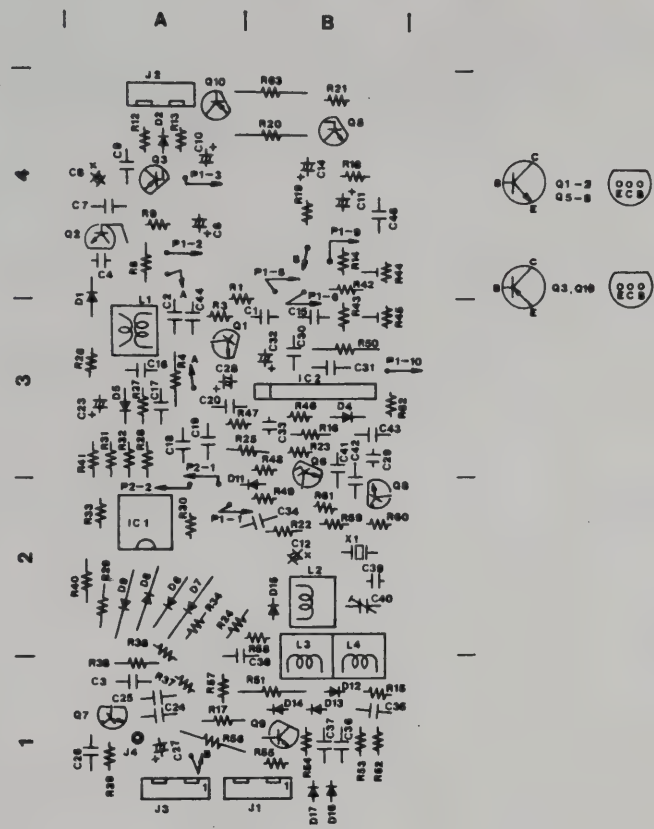
SCHEMATIC DIAGRAM



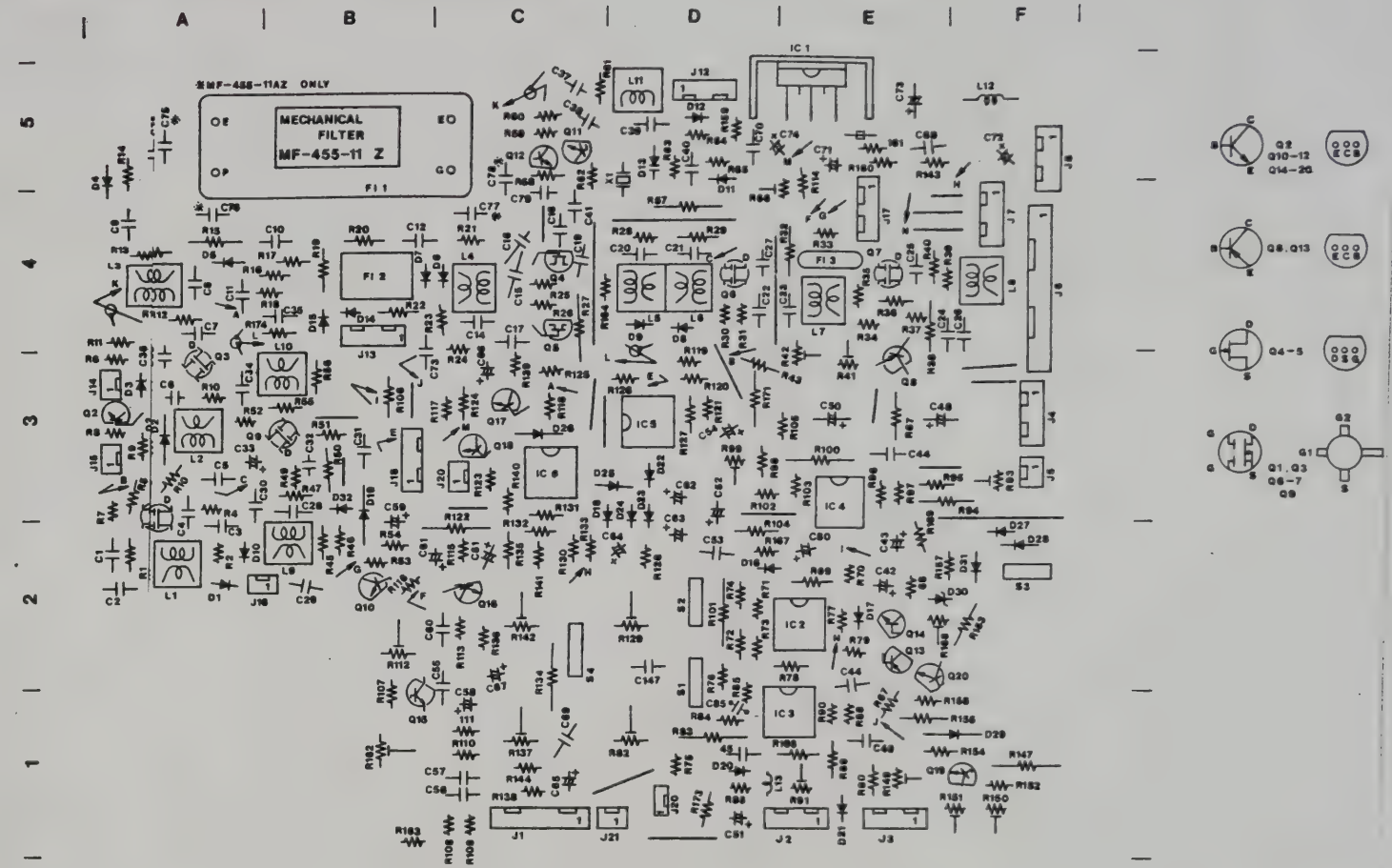
-11-



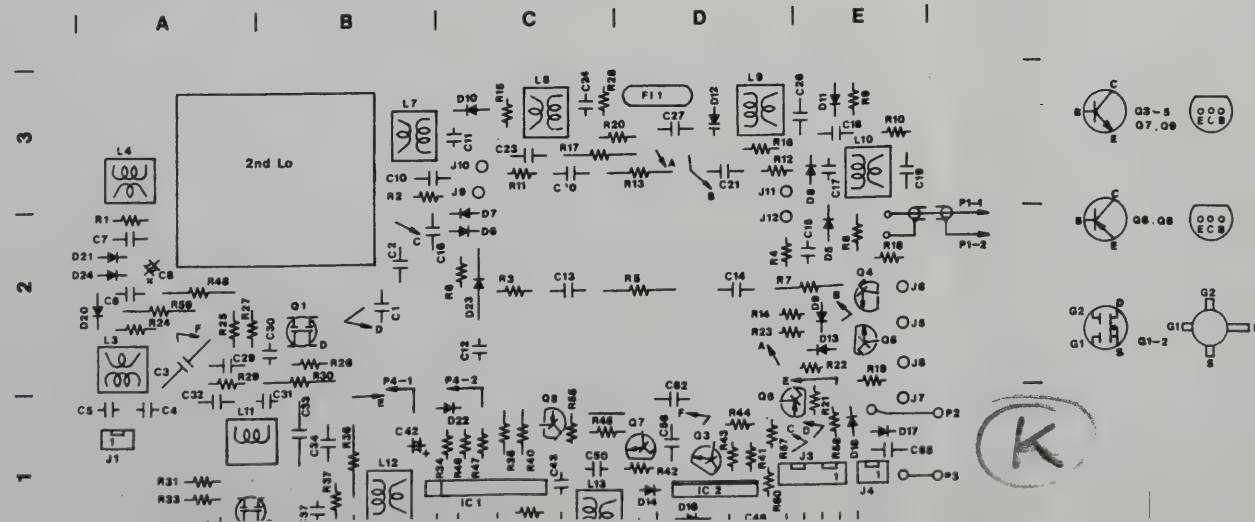
DETECTOR UNIT



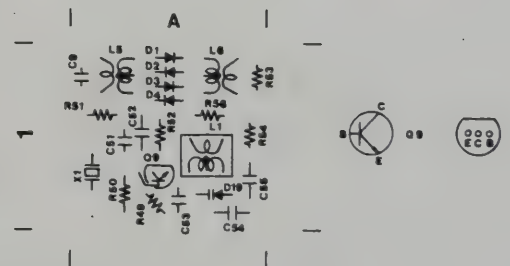
MAIN UNIT



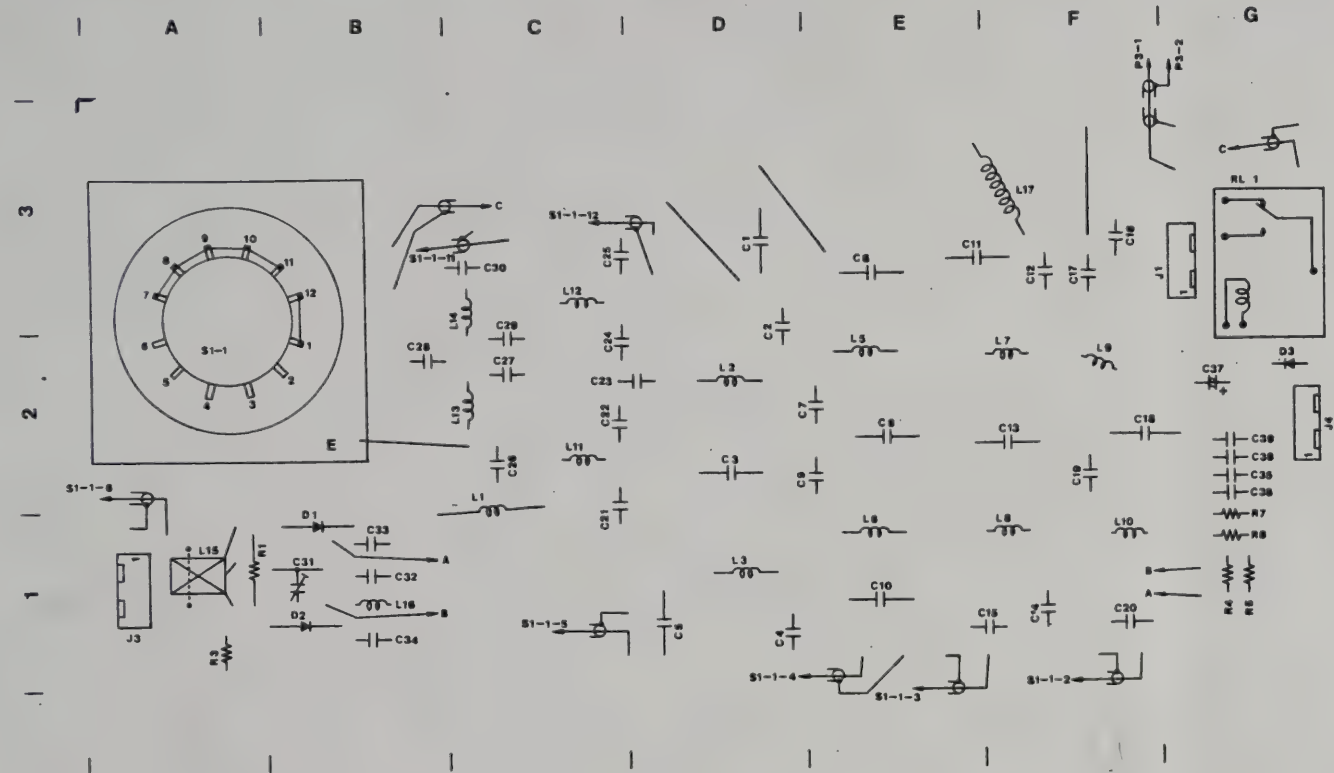
2ND IF UNIT



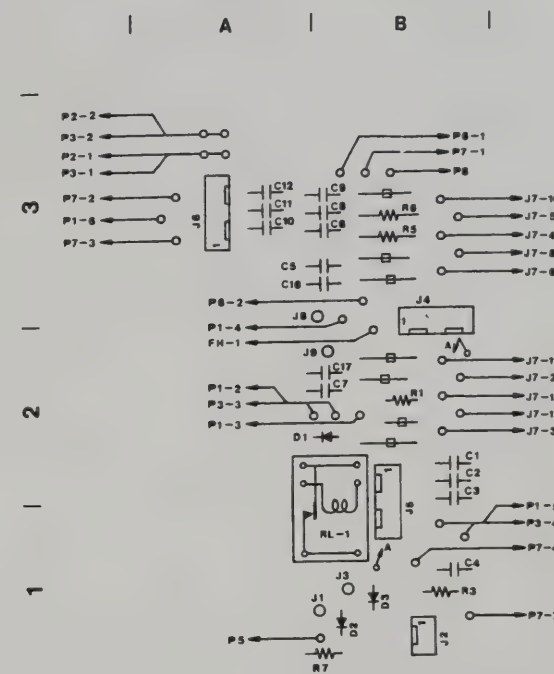
2ND LO UNIT



FILTER UNIT



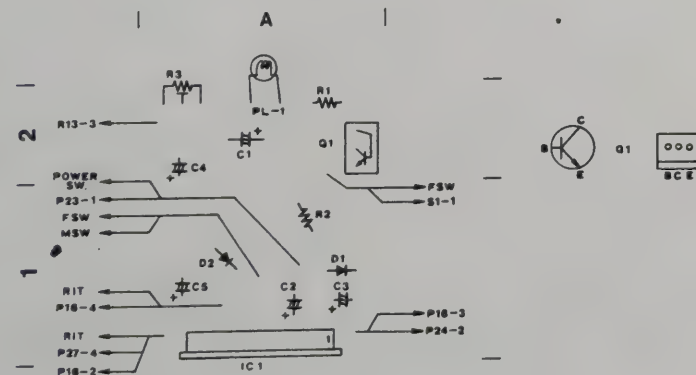
AGC UNIT



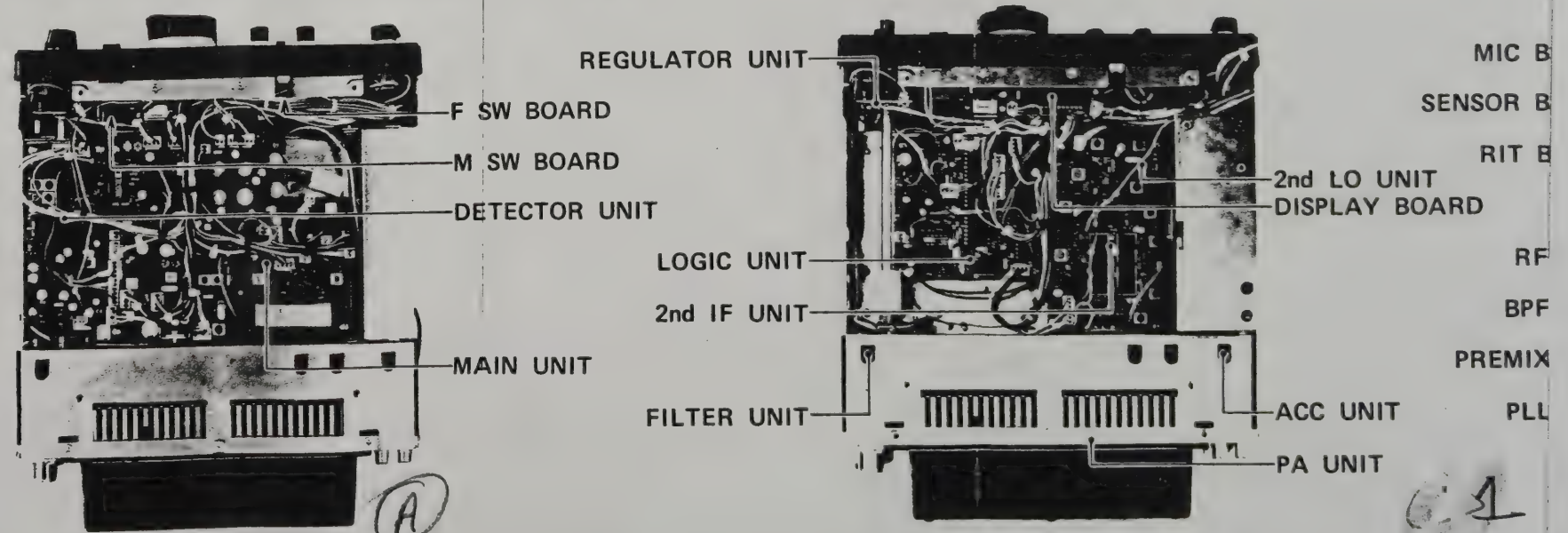
PA UNIT

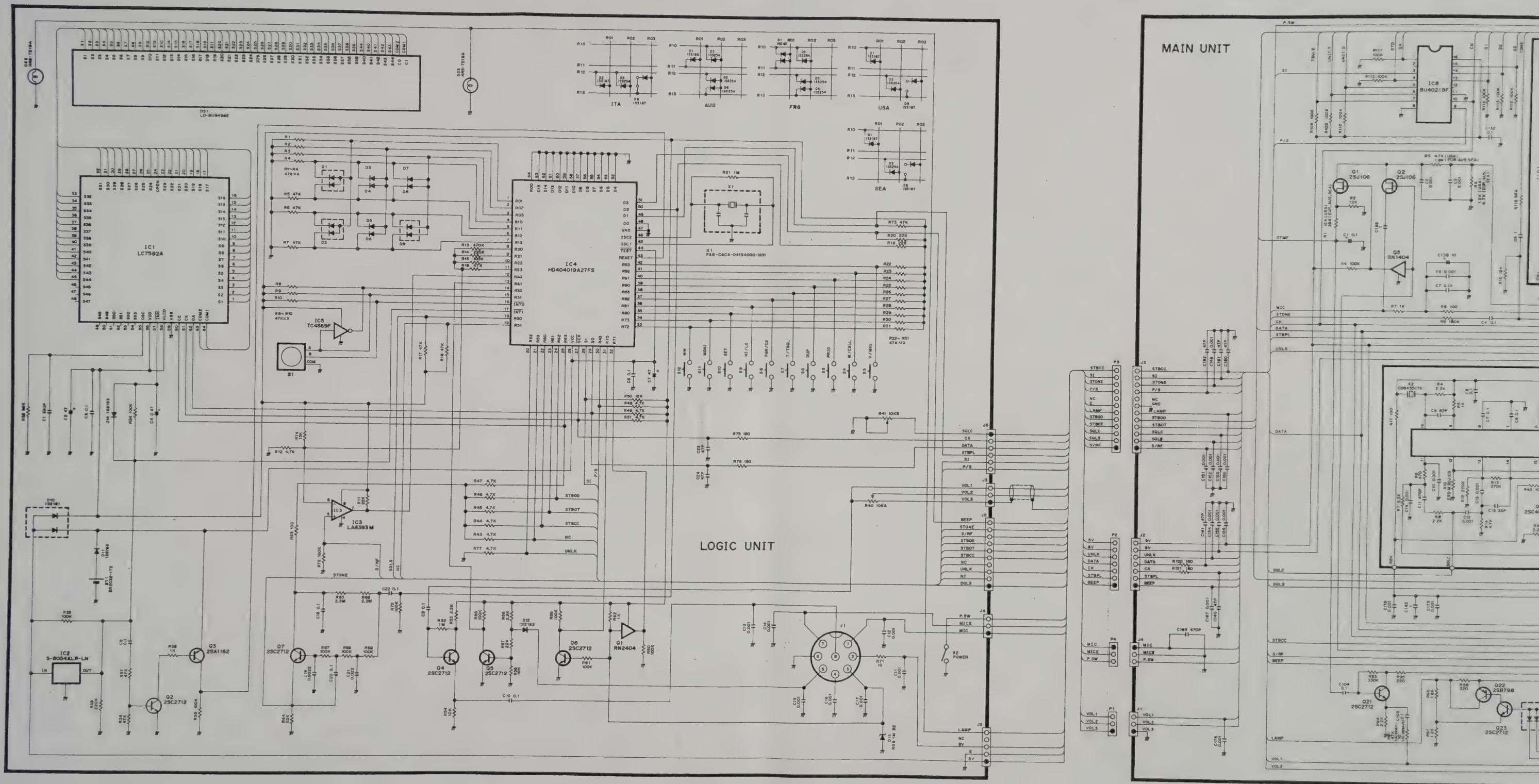


REGULATOR UNIT

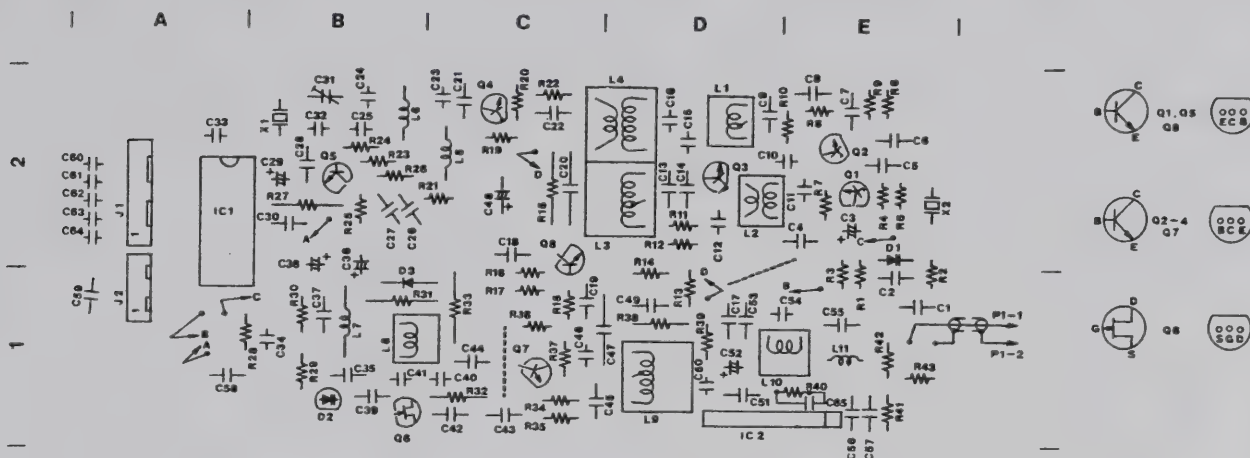


UNIT LAYOUT

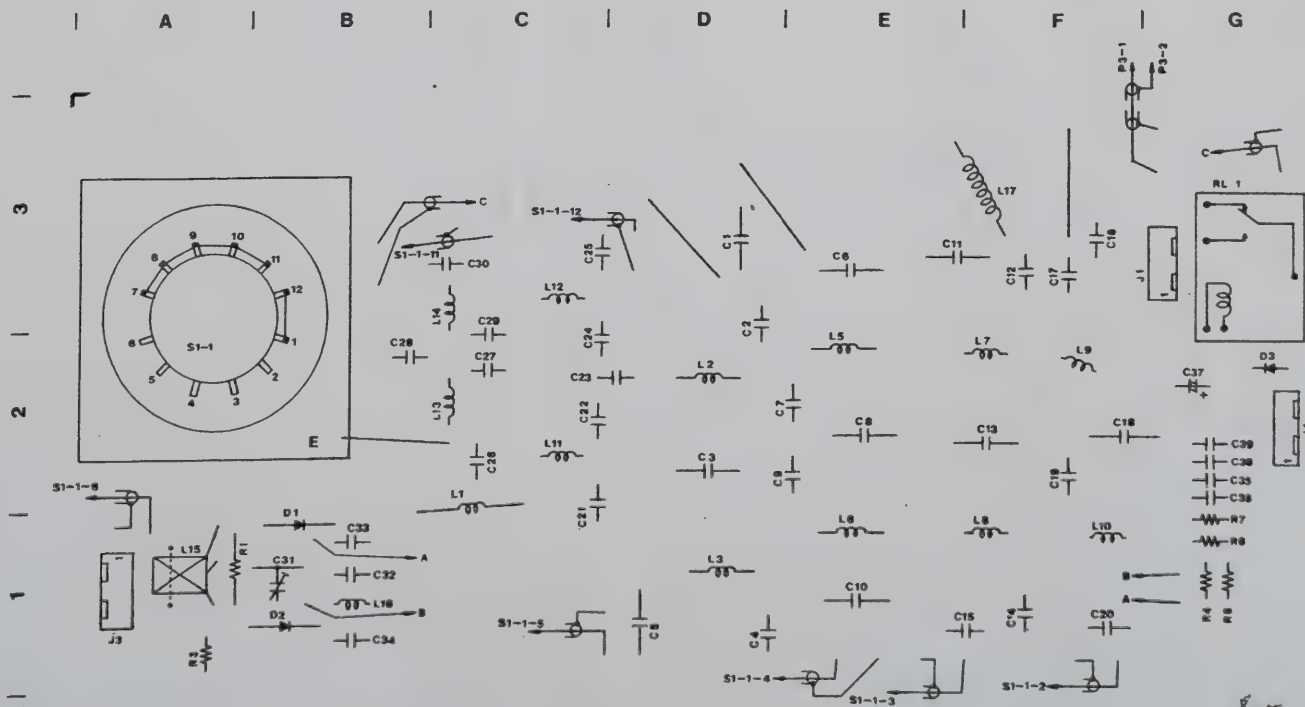




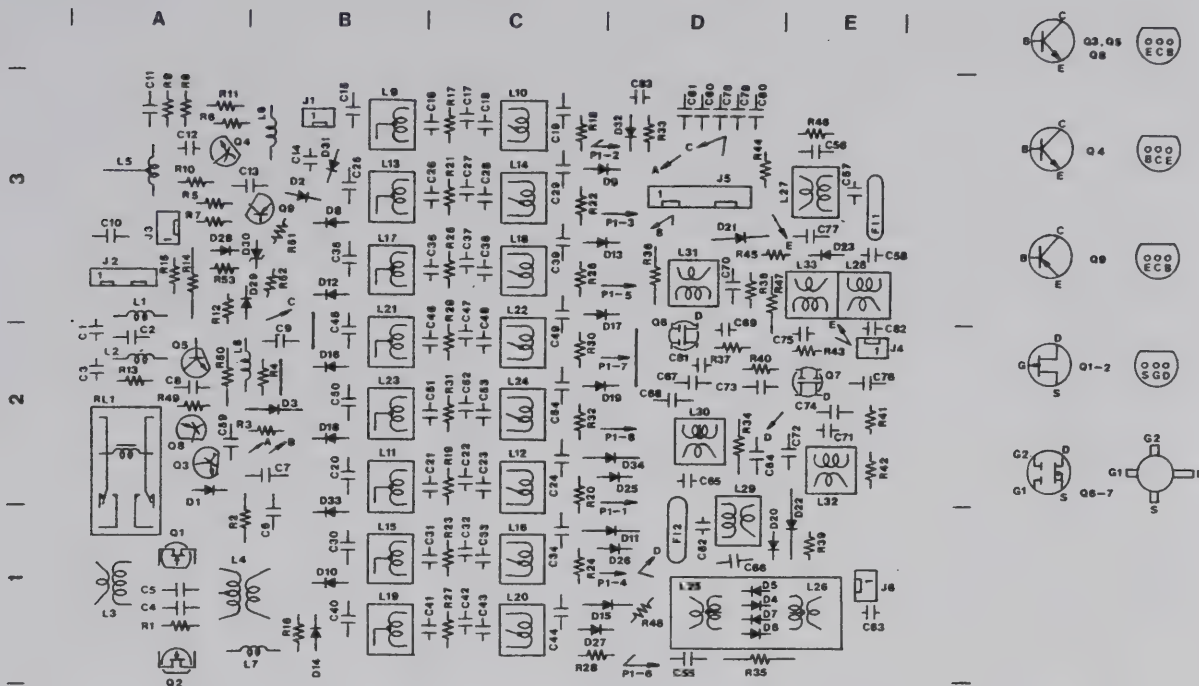
PLL UNIT



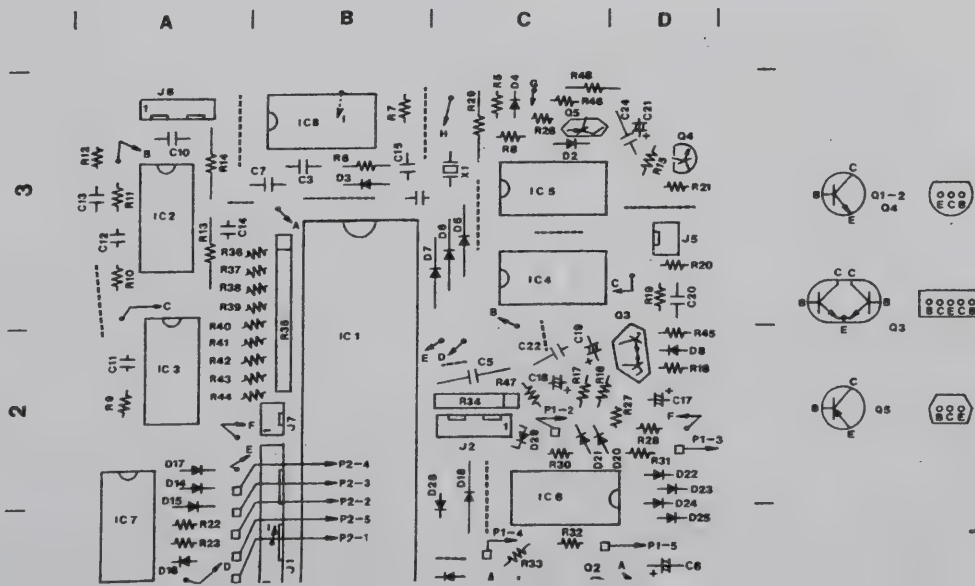
FILTER UNIT



RF UNIT



LOGIC UNIT



After transmitting, if the cooling fan is on, don't turn the POWER switch off until the set has had a few minutes to cool and the fan to switch off.

MEMORY OPERATION

Twenty memory channels, numbered 00 through 19, are available for storing frequencies and modes after selection on the vfos. The two vfos, denoted VFO A and VFO B, each hold frequency and mode independently, so there are actually 22 memories altogether.

VFO A/B Selection

The current operating vfo is indicated by "VFO A" or "VFO B" displayed to the left of the frequency. To select the alternate vfo, press the left (VFO) side of the VFO/MR button while receiving on a vfo. The frequency and mode of the other vfo are retained until selected again (in the same way).

VFO/Memory Selection

The memory number is always indicated on the display to the right of the operating frequency. While receiving on a vfo, press the right (MR) side of the VFO/MR button to select operation on the displayed memory: "MR" is displayed to the left of the operating frequency during memory operation.

To return to vfo operation from a memory, just press the "VFO" side of the VFO/MR button: once for the last-used vfo, and again for the alternate vfo.

Memory Storage

This procedure allows storage of the vfo mode and frequency into a memory channel;

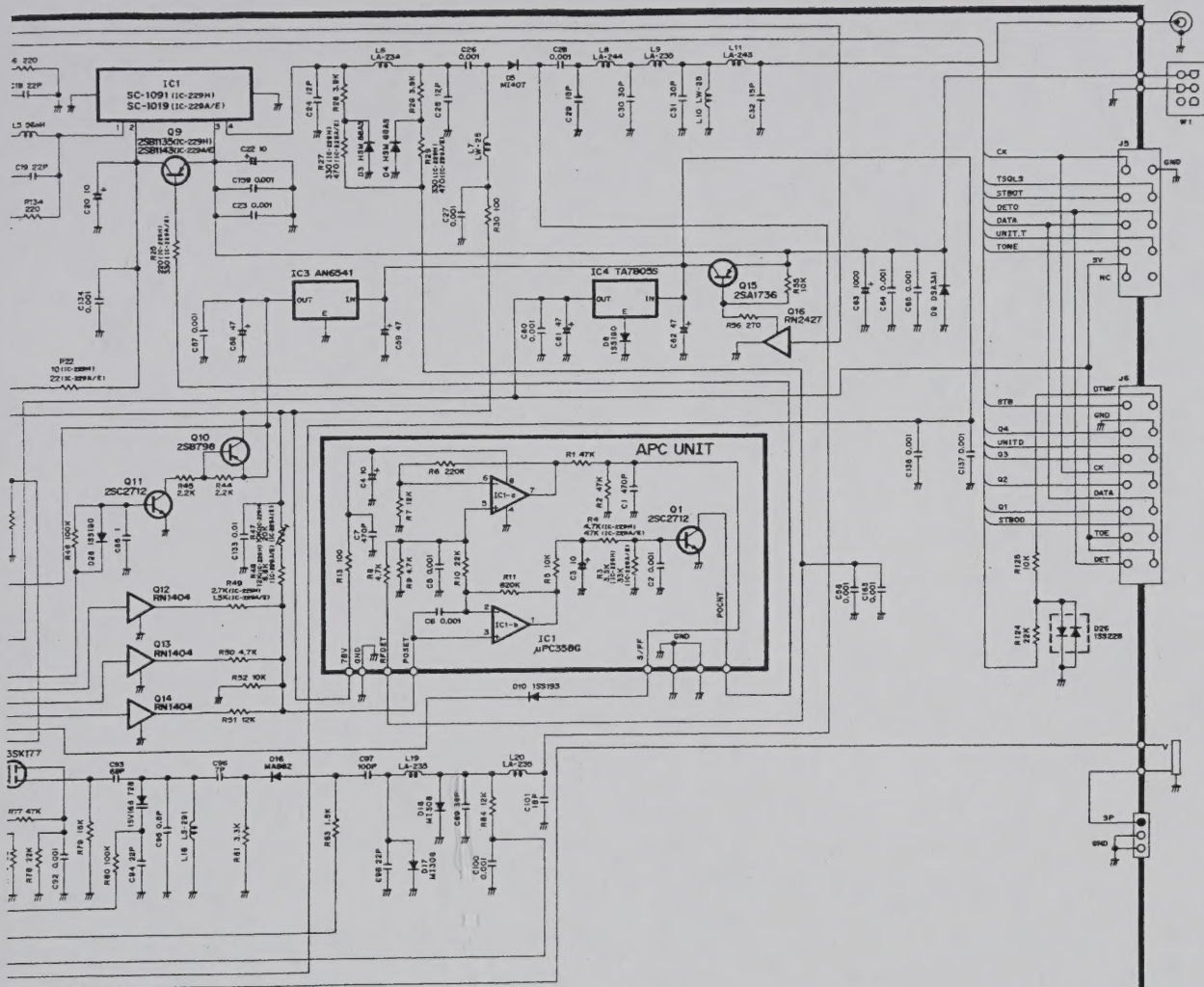
- (1) Set the vfo to the frequency and mode of emission to be stored.
- (2) Press the MR side of the VFO/MR button to switch to memory operation.
- (3) Press the microphone DWN/UP keys or turn the tuning knob to select an unused memory channel (default data is 10.000 MHz LSB in all channels), or one you are willing to overwrite.
- (4) Press the VFO side of the VFO/MR button to return to the vfo.
- (5) Press the VFO-M button to write the data from the vfo to the memory (operation remains on the vfo).

Note that the VFO-M key overwrites (erases!) the previous memory contents. Steps (2), (3) and (4) are required only to select the memory channel that is to be written. If you already know that the selected memory is free to accept new data, these steps can be skipped.

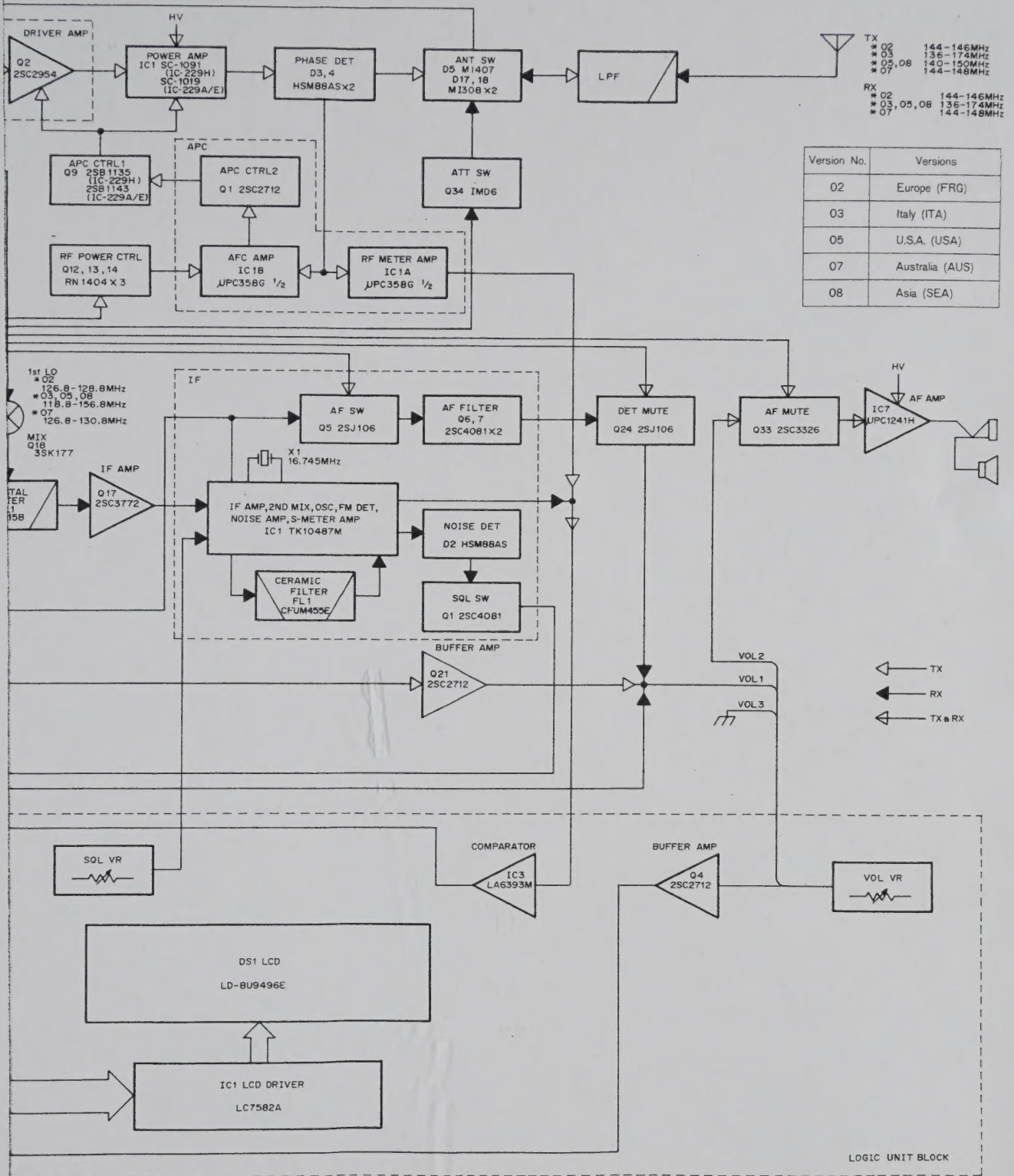
Memory Recall

- (1) Press the right side of the VFO/MR button to recall memories: the display and mode indicators will change to the displayed memory's data.
- (2) While watching the memory number (beneath "CH" at the right side of the display), press the DWN and UP keys on the microphone or turn the tuning knob to select different memories.

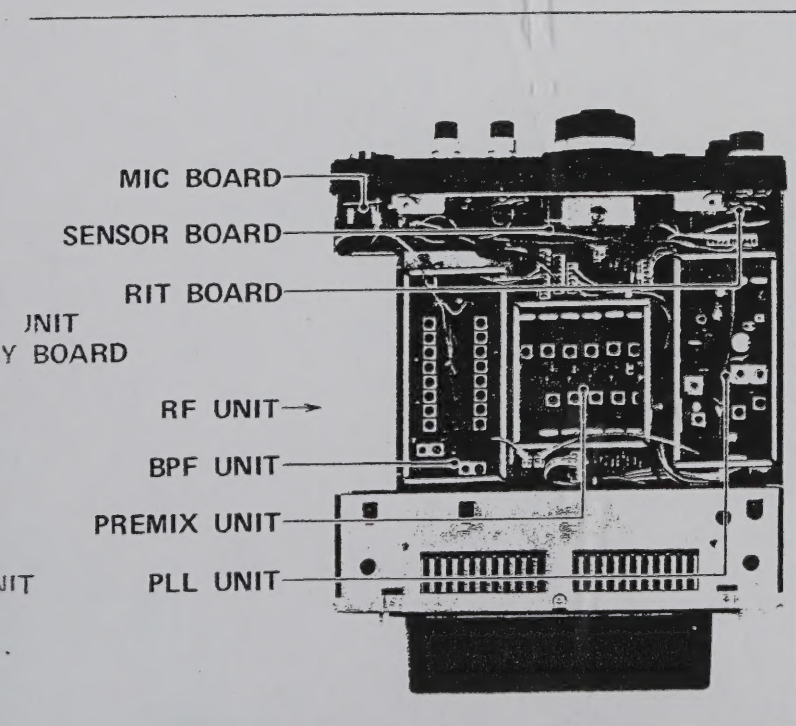
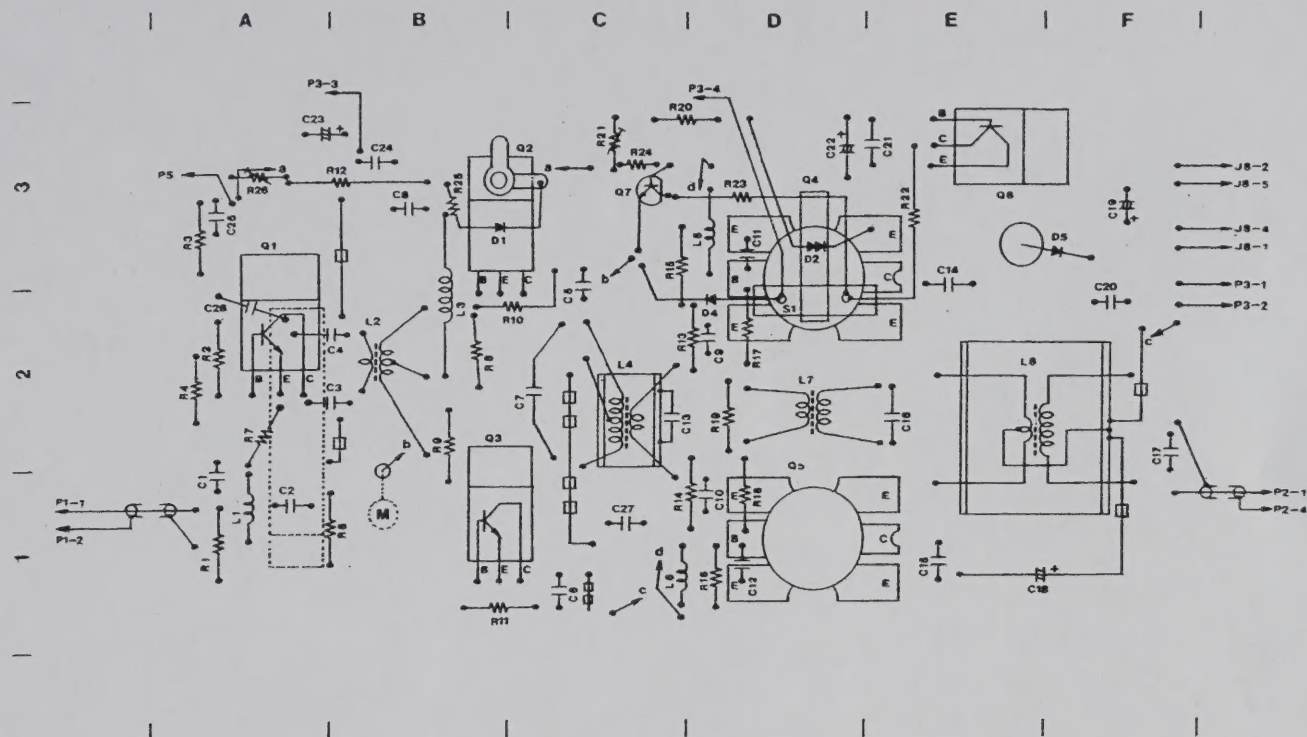
The mode of a recalled memory may be changed temporarily by the MODE keys. When another memory or a vfo is selected, the temporary mode selection is cancelled (but see the next procedure).



BLOCK DIAG. (CONT)



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